

CANADA
DEPARTMENT OF MINES AND RESOURCES

MINES AND GEOLOGY BRANCH

NATIONAL MUSEUM OF CANADA

BULLETIN No. 98

BIOLOGICAL SERIES No. 27

THE SOUTHERN HALF OF THE ALASKA
HIGHWAY AND ITS MAMMALS

BY

A. L. Rand



OTTAWA
EDMOND CLOUTIER
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1944

Price, 25 cents

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CHAPTER

The first part of the book is devoted to a general survey of the subject. It begins with a discussion of the importance of the subject and the scope of the book. It then proceeds to a discussion of the various methods of research and the results of the research. The second part of the book is devoted to a detailed study of the subject. It begins with a discussion of the various methods of research and the results of the research. It then proceeds to a discussion of the various methods of research and the results of the research.

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THE SOUTHERN HALF OF THE ALASKA HIGHWAY AND ITS MAMMALS

INTRODUCTION

The construction of the Alaska Highway allows easy passage into what had been one of the most inaccessible parts of Canada. To study wild life conditions in this area, the period from July 10 to September 19, 1943, was spent on the Highway, between Dawson Creek and Watson Lake, with most of the time, July 19 to September 18, in the section between Fort Nelson and Watson Lake, that is, in the upper Liard River drainage. The present paper is a summary of the author's observations, and a study of the collections of the mammals.

ACKNOWLEDGMENTS

The author is indebted to a great many people, some of whom gave freely of their time and resources in aiding the work. In particular, acknowledgment is made to Mr. L. E. Drummond of Edmonton.

In Dawson Creek Colonel Henderson, in charge of that area for the United States Army, offered many courtesies, and provided United States Army transportation for 400 miles up the Highway. To him, and the staff of the United States Army at the many stations along the Highway, the author is indebted for much.

Dr. M. Y. Williams of the University of British Columbia, to whose Geological Survey of Canada party the author was attached, did everything he could to help in the work. Dr. Williams, a keen naturalist, provided many notes of value that are included in the report.

From many army officers, construction men, and, in particular, trappers, much information was secured. Among these last were Mr. Tom Mould of Lower Liard Crossing, Mr. MacDonald of Lower Post, Messrs. Louis Leitmann and Eric Carmen of Tobally Lake, and Messrs. T. Foote and Christenson of Buckinghorse River. Dr. S. Holland of the British Columbia Government provided some interesting notes, as did Dr. H. M. Raup of Harvard University.

Mr. Butler of the British Columbia Game Commission supplied permits for the collection of resident animals.

R. M. Anderson, of the National Museum, gave much advice and assistance.

PREVIOUS WORK IN THE AREA

Intensive biological investigations have been carried out in several areas contiguous to that of the Fort Nelson-Watson Lake area, and the following fairly comprehensive reports are available for these nearby areas: Preble's¹ account for the biota of the Mackenzie region; Raup² for the plants and Cowan³ for the vertebrates of Peace River; Stanwell-Fletcher⁴ for the biota

¹ No. Amer. Fauna No. 27, 1908.

² Contr. Arnold Arboretum Harvard Univ. VI, 1934.

³ Occ. Papers B.C. Prov. Mus., No. 1, 1939.

⁴ Occ. Papers B.C. Prov. Mus., No. 4, 1943.

River, at about Mile 275 J, that Mr. French, the British Columbia Forestry Officer, said was about 10 miles long by about $\frac{1}{2}$ to 1 mile wide, and had burned some sizeable spruce; and the one that has burned some miles along the canyon of the Toad, which though it has burned no commercial timber, has burned far back from the road and will seriously affect trapping in that area.

Other smaller burns are to be seen from the Tetsa to north of Muncho Pass, and to the southeast of Muncho Lake, and on Smith River, a few miles above the road. These appear to be minor burns, and not comparable in size to the old burns that have swept the country in times past.

EFFECT OF THE HIGHWAY ON WILD LIFE

The effect of the construction of the Highway, and the presence of a large personnel in the country due to the Highway, has so far been practically nil. The Highway has destroyed an infinitesimal part of the habitat; and a very small percentage has been burned because of it.

Killing of animals by Highway personnel has been of no account. There may have been a few animals killed by guns, but probably more by being struck with motor vehicles. No one goes into the forest off the Highway. Going in from a construction or military camp, all human signs cease when beyond their wood-cutting area.

Black bears have benefited from the Highway; garbage dumps have provided an abundance of food that has brought them from far and near. These congregations of bears, and there was said to have been eighteen about one dump at one time, were one of the main sights of the Highway, and were a constant source of interest to the men employed there.

ITINERARY IN 1943

The Highway has a system of mile posts along it, which are convenient in referring to certain points. In the Dawson Creek to Watson Lake area there are three series: Mile 0 to 48 runs from Dawson Creek to Fort St. John; Mile 0 to 258 J, from Fort St. John to Fort Nelson Relay Station, 2 miles north of the Highway's crossing of Muskwa River; and Mile 0 to 252 N, from Fort Nelson Relay Station to Watson Lake Relay Station, which is situated at the junction of the Highway and the 8 miles of road that leads to Watson Lake airport. The key letter in the last two series serves to identify them. As the road has been continually improved, and its location changed somewhat to better grades and the like, its length is being changed, and the position of some of the mile posts on the finished road may be somewhat different from where they were in 1943, and from the mileage as shown on any existing maps.

The following is a synopsis of the itinerary. The accompanying map, Figure 1, with mileage marked, shows locations.

July 6, left Ottawa.....	
July 10, arrived Dawson Creek.....	
July 11, to Blueberry Relay Station.....	Mile 53 J
July 12-17, at Trutch Relay Station.....	Mile 157 J
July 17-19, at Nelson Relay Station.....	Mile 0 N
July 19-23, at McDonald Creek Camp.....	Mile 114 N
July 23-Aug. 4, at Muncho Lake Camp.....	Mile 172 N
Aug. 4-14, at Lower Liard Crossing Camp.....	Mile 213 N
Aug. 14-20, at Irons Creek Camp.....	Mile 313 N
Aug. 20-24, at Lower Liard Crossing Camp.....	Mile 213 N
Aug. 24-28, at Muncho Pass Camp.....	Mile 165 N
Aug. 28-Sept. 8, at Summit Pass Camp.....	Mile 104 N
Sept. 8-15, at Steamboat Mountain Camp (or Gard- iner Creek Camp)	Mile 64 N
Sept. 15-18, at Muskwa Crossing Camp.....	Mile 252 J
Sept. 18, to Buckinghorse River.....	Mile 134 J
Sept. 19, to Dawson Creek.....	

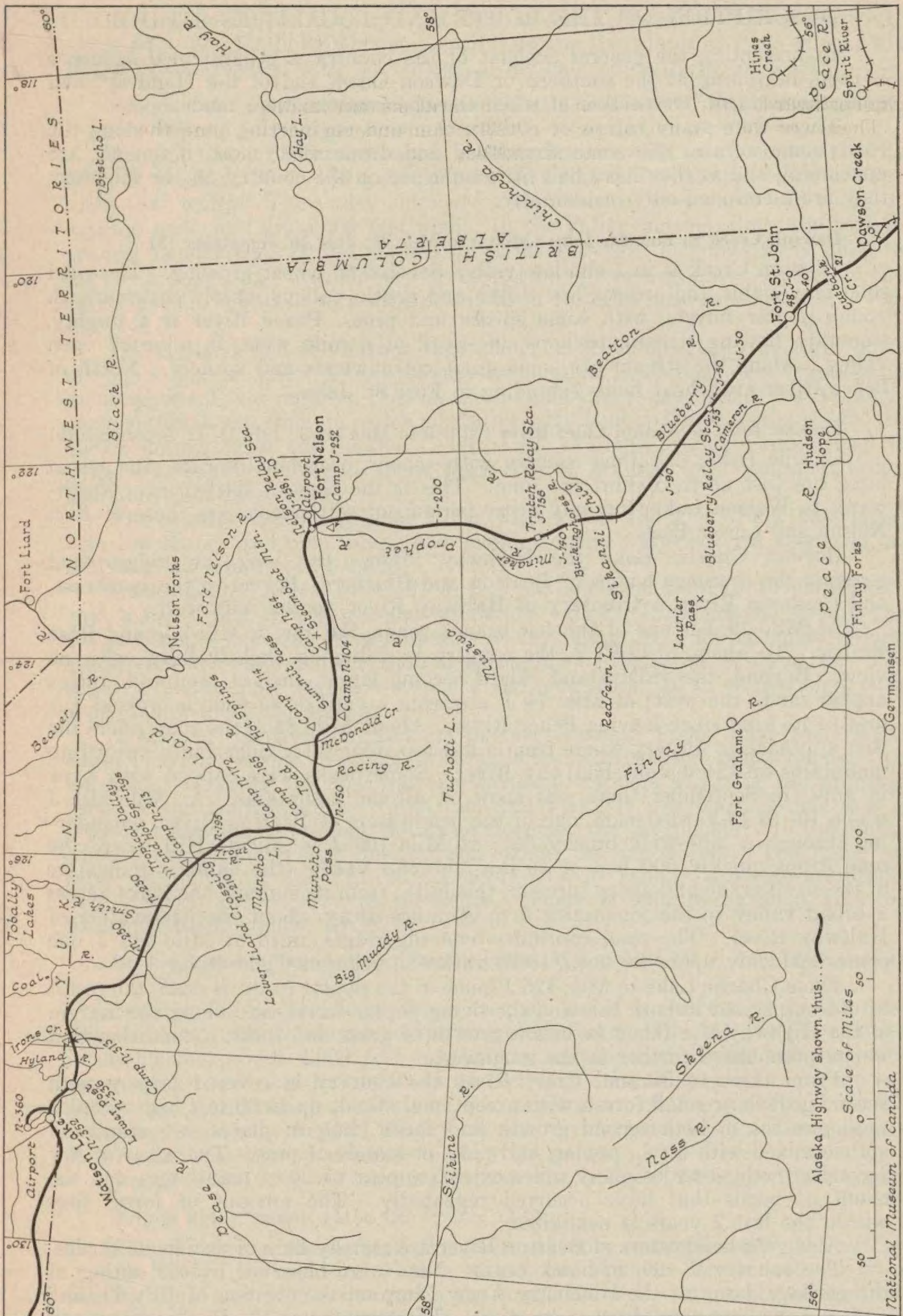


Figure 1. Section of Alaska Highway covered by A. L. Rand, 1943, with camps and mileages marked.

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DESCRIPTION OF THE ROUTE AND LOCALITIES STUDIED

In presenting the general account of the country a geographical sequence is used, beginning at the southern or Dawson Creek end of the Highway, and going northward, irrespective of when the observations were made.

There were many camps of construction and engineering parties along the road; some were in use, some abandoned and dismantled; most, if not all, are ephemeral, and as they have had little influence on the country off the Highway they are mentioned only incidentally.

Dawson Creek to Fort St. John (Mile 0 to Mile 48; July 19, September 18)

Dawson Creek is in a shallow valley devoted to wheat growing. The road soon leaves this and crosses low ridges and gentle valleys mostly covered with young poplar forests, with some spruce and pine. Peace River is a mighty, smoothly flowing stream, perhaps one-third of a mile wide, in a broad open valley. Along the stream are some giant cottonwoods and spruces. North of Peace River are wheat fields extending to Fort St. John.

Fort St. John to Sikanni Chief River (Mile 0 to Mile 119 J; July 11, 12, September 19)

Charlie Lake, in rolling country with aspens, occasional spruce, and wheat land, lies just north of Fort St. John. This is the edge of settlement. Northward, to Watson Lake, the only other permanent settlements are those of Fort Nelson and Lower Post.

Beyond Charlie Lake the Highway follows the long low ridges that separate the drainage basins of Beatton and Blueberry Rivers to the northeast, and Cameron River, a tributary of Halfway River, to the southwest.

At Mile 19 J is one of the few branch roads, the one to Murdale and Rose Prairie. To about Mile 63 J, the country is rolling to slightly hilly, with no view. Beyond, the valleys and ridges become larger, distant mountain ridges appear far to the west; at Mile 74 J, a stream a yard or so wide is crossed, the first of its kind since leaving Peace River. About Mile 84 J, the road offers the first approach to scenery where from a hill top ridge after ridge fades away into mountains on the distant Halfway River. Some peaks were capped with snow in July; in September there was snow on all the mountains. At Mile 101 J was a 10- to 15-yard stream, one of the headwaters of Beatton River, meandering through a mile-wide brushy flat; at Mile 109 J is Suicide Hill where the road drops quickly 500 feet or so into a broad valley (the name is indicative of the steep grade and sharp turns on this hill); from its summit one looks across a broad valley to the mountains 5 to 20 miles away, about the headwaters of Halfway River. The road continues over big ridges, until at Mile 117 J one comes suddenly upon the deep, steep valley of Sikanni Chief River.

From Charlie Lake to Mile 125 J much of the poplar forest is dead, the result of old burns, and in both this and the living poplar forest, and along the margin of the Highway is a fairly luxuriant growth of grass and forbs, a condition that is less pronounced farther to the northwest.

From there to Sikanni Chief River the country is covered largely with second growth or small forest, with exceptional stands up to 60 feet high. Poplar predominates in both second growth and forest, but, in places, are stands of spruce mixed with birch, poplar, and pine, or stands of pine. The areas of low second growth, some of many miles extent, appear to be of many ages and the result of burns that have occurred repeatedly. The amount of forest fires within the last 2 years is negligible.

Along the headwaters of Beatton River are marshy flats of deciduous shrubs.

The country is rich in black bears. Nine were observed by the author at the garbage dump at the Blueberry Army camp on the evening of July 11, and sixteen have been seen there at one time. The trappers on the Buckinghorse say

this is excellent moose country, and that on the headwaters of Beaton River (Mile 80 to 90 J) rabbits were so plentiful during the winter of 1942-43 that the Highway was littered with the corpses of animals killed by motor traffic.

Sikanni Chief and Buckinghorse Rivers (Mile 117 to Mile 131 J; July 12, September 18, 19)

Sikanni Chief River is a rapid, shallow stream with many boulders in its bed. It is about 75 to 150 yards across, in a flat valley bottom three or four times that width. The valley sides are precipitous, of grey earth and rocks or exposed rock, and are 1,000 feet high. In the valley bottom along the stream are tall slender spruces and poplars up to 60 feet high; in places herbs cling to the steep slopes, and near the top are scattered spruce and pine. Upstream the valley bottom broadens to a mile or so; 10 to 15 miles upstream mountains rise sharply.

Dr. Holland told the author that about 10 miles upstream the river flows through a canyon where he saw twenty-seven goats in one day; the trappers on Buckinghorse River reported that on the Sikanni Chief, near where the Buckinghorse enters it, are cliffs on which goats live. Holland spoke of seeing Harlequin ducks summering on the Sikanni Chief. Cliff swallows probably nest along its cliffs, a colony being found about the eaves of a construction camp building just above the river valley.

The country to Buckinghorse River, Mile 120 to 130 J, is of low flat ridges, with low spruce and pine forest, and some extensive burns several years old, as well as a few minor recent burns.

Buckinghorse River, Mile 131 J, is a shallow stream 10 to 15 yards wide with a rocky bed, flowing through a shallow valley. In places the stream has cut into ridges exposing steep cutbanks of dark shale 10 to 30 feet high. Along the stream are some dense stands of spruce up to 16 inches in diameter. The country for the most part is low spruce and pine forest, 30 to 40 feet high, with some willow along the stream.

A trapper, Christenson, and his partner, Thomas Foote, have their home cabin near the bridge over the Buckinghorse. Christenson registered on this line about 13 years ago, and has the exclusive trappers' rights to the drainage basin of the Buckinghorse. From him and Foote it was learned that this is a good moose country, though not so good as that on the Blueberry to the south; caribou are common here summer and winter, as are wolves. The main fur catch is fox, lynx, and marten. Fluctuations in rabbits are less noticeable here than in the country to the south. There is said to be good grayling fishing in Buckinghorse River.

Buckinghorse to Trutch Relay Station (Mile 131 J to Mile 157 J; July 12, September 18)

Leaving the Buckinghorse one is soon on top of a plateau, where the road follows along near its abrupt southwestern edge until Mile 151 J. The plateau is undulating, about 4,000 feet in altitude, and clothed almost entirely with dense spruce and pine forests 20 to 30 feet high. In many places one can see across the broad wooded valley of the headwaters of Prophet River to the imposing mountains beyond that form the divide between Liard and Peace Rivers, and which are renowned for their big game.

About Mile 151 J, the long descent into the valley of Minaker River began.

Trutch Relay Station (Mile 152 J; July 12-17)

The road being closed ahead, the country locally was explored by the author.

At Trutch the road is about a mile from Minaker River, well up on a smooth slope east of the river. To the southeast, a few miles, the abrupt end of a plateau rises about 1,000 feet; to the east and northeast are a few isolated,

more or less conical hills, and many low ridges and flat, boggy valleys. To the north and west lies the broad, smooth valley of the Minaker, separated from that of Prophet River by low ridges, and about 15 miles west rise the nearest of the Rocky Mountains, rather regular in outline for the most part, but with here and there peaks rising to 8,000 feet. Some were snow-capped in late July; in September they had much snow.

Second growth and young forest up to 50 feet high, the result of old burns, cover the country. Often spruce regrowth predominates, in some places with much willow, or if drier there may be a great deal of jack pine. In one regrowth area, where dead, charred 30-foot stubs were still standing, it had taken the spruce 10 years to reach a height of 5 feet. In places there was much poplar, and some white birch. Dwarf birch and labrador tea, bunchberry, a trailing blueberry, and mosses and lichens were common. Spruce-sphagnum-labrador tea muskegs were common and of considerable extent.

Minaker River was a rather rapid, shallow, boulder-strewn stream, with tall, up to 16-inch, spruce in small areas along its margin, and periodically flooded grass and shrubbery marsh areas a few hundred yards wide in the river bottom.

This is apparently a good game country, with moose droppings and old, well worn game trails common; one shed moose antler was picked up; caribou are said to live some distance to the northeast, and one set of horns was seen. The common, conspicuous birds are junco, chipping sparrow, blackpoll, and myrtle and palm warblers. Fishing for Dolly Varden trout and grayling is said to be very good in Minaker River.

A band of Beaver Indians was said to have camped in the valley bottom the previous winter, and to trap in the area.

Trutch Relay Station to Fort Nelson Relay Station (Mile 157 J to Mile 258 J; July 17, September 18)

The road follows north just east of Minaker and Prophet Rivers to Muskwa River.

The mountains about the headwaters of the Prophet gradually recede into the distance and were last seen from about Mile 180 J, though low-lying clouds may have obscured more distant views. To about the same point the view to the east shows flat-topped hills, perhaps 1,000 feet higher than the road, with grey-brown cliff faces fronting the valley. To here the road has crossed low spruce-sphagnum bogs, old burns with aspen and willow regrowth 5 to 10 feet high, with many 40-foot, charred stubs still standing, and aspen and spruce forested, low ridges with trees 40 to 50 feet high. At Mile 174 J is the first extensive fresh burn, a burn that the British Columbia fire warden, French, later reported was about 10 miles long and $\frac{1}{2}$ to 1 mile wide. Some limited stands of spruce, 60 to 70 feet high, and the best timber seen so far had been burned. The fire occurred in May of this year (1943).

At Mile 180 J a good view of the Minaker is obtained, just before its junction with Prophet River. It is here a shallow, meandering stream occupying only part of its gravelly bed; soon a 15-yard stream is crossed, and at Mile 185 J is a sawmill. This stretch of road near the river from about Mile 180 J to 195 J has much good spruce timber 12 to 16 inches through at the base.

From about Mile 195 J to 205 J the road crosses hilly country, with small streams and mixed stands of spruce, poplar, and white birch forests up to 50 feet high. The groups of white trunks of the birch and aspen make pleasing pictures against the dark spruce; the ground is heavily moss carpeted, and bunchberry and twin-flower flourish.

About Mile 207 J, the road comes out onto flat ridge tops with spruce muskegs and stands of young spruce predominating. And again there is a view

to the west over a wide wooded valley of the Prophet and low mountains beyond; pine appear again along the road, in young spruce stands. There are many small streams of yellow water a foot or so wide.

Near Big Beaver Creek, Mile 221 J, a stream 5 to 15 yards wide, the country becomes somewhat hilly and covered with mixed stands of aspen, spruce, pine, and birch. Jackfish Creek is a 20- to 30-yard stream flowing over rocks and gravel in an open aspen valley, with much low deciduous second growth and broken forest. This mixed type of country continues to the Muskwa. At Mile 250 J there is a view to the east over the valley of Nelson River. At Mile 256 J is the Muskwa, a 75- to 100-yard river in a valley similar to that of the Nelson. The Relay Station is about 2 miles beyond, at Mile 258 J, and here a new series of mile post numbers start at 0, distinguished by the letter N.

Fort Nelson Relay Station (Mile 258 J or Mile 0 N; July 17-18, September 15-18)

Two nights were spent at the Relay Station in July, and three nights camped above the Muskwa near Mile 253 J in September. Trips were made by motor to the Muskwa airport and to the settlement of Fort Nelson.

The rivers, Muskwa and Nelson, flow in broad, rather steep-sided valleys a few hundred feet below the general level of the surrounding, gently hilly country.

PLATE I



Fort Nelson, from across Fort Nelson River. The flood in August 1943 inundated most of this settlement. (Photo by M. Y. Williams.)

The Muskwa is 75 to 100 yards wide; the Nelson, at Fort Nelson settlement, just below its junction with the Muskwa, is a 100- to 150-yard stream. Both have many sand and gravel bars in their beds, and in many places the bed is margined with a 10- to 15-foot cutbank. Evidently, flooding is common. In July of 1943, however, a flood higher than ever before recorded occurred. Almost all of the Fort Nelson settlement was flooded; when visited the flood water marks were visible on the walls of many of the cabins and on gardens well above the river. Little but the Hudson Bay Company Post stood above

the flood. At Muskwa River bridge the water rose more than 30 feet in 24 hours.

Most of the country is wooded. In the valley bottom are stands of cottonwood and spruce from 12 to 30 inches in diameter. On the ridges aspen predominates and near the relay station the ridges carry beautiful aspen groves with trees up to 60 feet high; a few spruce of the same size are scattered through them; the ground beneath is partly mossy, partly covered with a litter of dead leaves. Bunchberries, as well as other herbaceous plants, grow scatteredly on the ground, and there is an open stand of shrubby undergrowth 3 to 10 feet high, including alder, gooseberry, rose bush, and high-bush cranberry. This is fairly characteristic of the country, but especially south of the Muskwa there is much young regrowth.

Muskwa airport lies about 6 miles east of the Relay Station, on a branch road. Along the road were once some good stands of spruce up to 16 inches in diameter, but they are now lumbered for local use. At Muskwa is the post office of that name, where in the 11 months preceding July, \$560,000 worth of business was done in an unpainted wooden shack about 20 feet by 40 feet in size.

Past Muskwa the road drops into the valley of the Nelson where there is a fairly extensive, tall, dense stand of poplars and spruces up to 30 inches in diameter, and where a sawmill is supplying local lumber needs. The road ends opposite Fort Nelson in a Hudson Bay Company garden of potatoes and sunflowers on the left bank of the river. Two little Indian boys ferried the party across for 25 cents a person.

Fort Nelson itself is a straggling settlement on benches on the right bank of Nelson River. There is a Hudson Bay Company Post, a free trader (Clarke), a combined store and post office, a British Columbia Police Station, and a number of cabins owned by the more prosperous trappers and Indians, as well as some tent encampments of Indians. There are, perhaps, two dozen permanent establishments.

Gardens, seen in September, containing potatoes, corn, turnips, cabbage, beets, carrots, beans, peas, cucumbers, sweat peas, and gladiolas flourished, despite the fact that many of them had been flooded in July. This flood was 4 feet higher than any remembered flood.

The gardens are very limited in size, and the country immediately surrounding the settlement was covered with low second growth in which poplar, red osier dogwood, willow, alder, birch, rose bushes, and grass were conspicuous. Weeds are luxuriant in the gardens.

A number of large dogs, young and old, were seen, as well as horses.

It was from here that many trappers were flown to their trapping areas in northern British Columbia and the southern Yukon. A number of trappers were met here, including Larsen of Larsen Lake, and Eric Carmen of the adjacent (to the west) Tobally Lake area, who gave information on their areas. They all agreed that the Fort Nelson country is not good meat country (game, moose and caribou, are not common). The same is true for most of the country through to Watson Lake. The country from Prophet River southward is much better.

A flock of some dozen house sparrows was seen at Fort Nelson, and migratory flocks of robins were common.

The camp at Mile 252 J, just south of Muskwa, was in 10- to 20-foot aspen regrowth, on the edge of an alder-willow-spruce-larch swamp.

Black bears had been plentiful about a nearby construction camp garbage dump during the summer, but had almost ceased visiting the dump after an Indian had shot one there in the autumn. A sign posted near the dump read "For our safety do not molest the bears". Ravens were still common, about fifteen

being seen daily (farther south, few were seen). On September 15, a large flock of sandhill cranes went over, and on September 17, four flocks, the largest of about ninety birds, went over during the day, and during the night several more were heard going over. On September 17 a number of hawks, including a black redtail, two roughlegs, several goshawks, and a pigeon hawk, were seen, more hawks than observed in a day elsewhere on the Highway. Apparently they were migrating. Great horned owls came hooting about camp nightly.

Nelson Relay Station to Steamboat Mountain (Mile 0 to Mile 64 N; July 19, September 15)

For about 20 miles the country is low, ridgy, and poplar-covered, similar to that at Relay Station. In a few places are small areas of low spruce, alder, and willow. Near Mile 17 N one gets a view of open water (apparently a lake several miles long), a mile or two off the road to the west in a broad, flat valley.

About Mile 20 N the country becomes flatter and spruce-covered, and from Mile 30 N to 44 N many of the trees are up to 15 and 20 inches in diameter, though low spruce bogs, and burns of various ages also occur. A sawmill was operating on Kledo River, and the supply of spruce is so good there that at one time it was proposed to supply bridge timber for the construction work as far north as Muncho Lake, Mile 172 N.

Raspberry River, a 10-yard stream in a shallow valley of mixed forest, is at Mile 25 N; soon glimpses of the mountains ahead are obtained. At Mile 36 N is Kledo River, a shallow, 30-yard stream. Steamboat Creek, Mile 40 N, a 10-yard stream, flows in a shallow valley clothed with tall spruce.

There have been a few local recent forest fires in this stretch of road.

This spruce and sphagnum country is said to be a good black bear country, where they are often seen along the road.

From Mile 44 N to Mile 51 N the country rises perhaps 1,000 feet through mixed young forest of poplar, pine, spruce, and birch, to cross a fronting foothill spur. At Mile 51 N the road is definitely in the foothills, and for the first time the Highway becomes scenic. In the valley that spreads ahead, the junction of Tetsa River from the west and Muskwa from the south shows nearly below. Up the broad wooded valley of the Tetsa the snow-capped peaks of the Rockies show 20 to 30 miles away, and near at hand, on the north of the valley of the Tetsa and near the Highway, are Teepee Mountain and flat-topped Steamboat Mountain.

From Mile 51 N to Mile 64 N the new road stays well up on the slopes above Tetsa River, giving many good views. The steep mountain slopes are covered to their tops with forests of small pine, spruce, and poplar or with poplar second growth.

Steamboat Camp (Mile 64 N; September 8-15)

This camp was named from the flat-topped, steep-sided mountain 2 hours' walk to the north of it. The camp was near Gardiner Creek, a mountain stream a few feet wide, in the edge of an extensive old burn that extended far to the west, on the north slope of Tetsa Valley.

Steamboat and Teepee Mountains rose as peaks a few miles to the north; for the rest the country sloped gently down to the Tetsa a few miles to the south.

From the top of Steamboat Mountain a good view is obtained. To the south and west, steep wooded slopes drop to the broad, extensive, wooded valleys of the Kledo and the Muskwa with dimly seen hills beyond; to the north, are a series of flat-topped mountains similar to Steamboat, that rise from wooded hills; westward, the land slopes smoothly and slowly down to the Tetsa, and beyond, up Tetsa River, rise the grey, partly snow-capped peaks of the Rockies.

PLATE II



Steamboat Mountain, with burned country in the foreground.

PLATE III



Looking northwest from near Steamboat Mountain, toward the Rockies, over the valley of Tetsa River.

The country about camp was covered with shrubs and second growth, following a burn many years old. In some places the regrowth was 10- to 20-foot poplar, often with much willow in it; here and there little but grey and blackish lichens covered the soil; in places labrador tea was dense, with a deep moss carpet; in places the flat slopes were boggy, and low willows predominated; in places there were areas of rich grass, of some score yards in extent. Fireweed, turning red in September, rose bushes, high-bush cranberry, and grasses were scattered throughout much of the regrowth, and everywhere were dead, charred stubs.

Horses have wintered on the lower flats in this area.

A few unburned forest patches persisted. One was a lovely stand of nearly clear spruce, of trees about 4 to 5 inches in diameter, and with a dense carpet of green moss. The forest visited to the east was mixed, of aspen, pine, birch, and spruce, and near the bottom of the valley contained trees up to 60 feet in height. But it was almost all in broken stands, due to rock exposures and to the slipping of the earth on the hillsides. On these earth slips alders and grasses grew in profusion.

On the crest of the ridge, between Steamboat and Teepee Mountains, were some willow swamps, some muskeg spruce stands, and, on dry slopes, young pine forest.

This appears to be poor game country. Only a few old moose signs were seen. There were few deer and bear signs, and even few wolf tracks. Weasels came into camp here. Red squirrels occurred even in clear stands of aspen. Birds were very scarce in the extensive second growth areas, but in the forested parts of the country juncos in migration were common, as were robins and myrtle warblers. Canada jays were common in the spruce forests.

Steamboat Camp to Summit Camp (Mile 64 N to Mile 104 N; July 19, September 8)

The road follows over gentle slopes along the side of Tetsa Valley. At Mile 67 N it crosses Mill Creek, a 15- to 20-foot stream flowing through a gravelly gulch that joins the Tetsa a mile or so to the west. To here the surrounding country is all low second growth. A trapper, Haroldson, has his home camp on Tetsa River near Mill Creek, but when visited he was "outside".

Beyond Mill Creek the country is of broad low ridges to where the road enters Tetsa River flat at about Mile 82 N. This stretch of road runs through recently burned spruce country, with only occasional stands of spruce muskeg that escaped the fire.

Along the river flat is a 40- to 50-foot stand of spruce or pine, although the country is still burned on the hills above. Ahead, about Mile 86 N, the road enters the narrow valley, with a flat bottom a few hundreds yards wide, with tall spruce, and some poplar. Low hardwood clothes the steep slopes. At Mile 87 N is a camp where a sawmill has sawn lumber for local use. At Mile 88 N the road comes out on the Tetsa, a shallow, rapid mountain stream of several channels flowing through a series of boulder and gravel bars. In all there was perhaps 50 yards of water, 4 to 5 feet deep at the most. Flooding is evidently very bad. Good grayling and Dolly Varden trout fishing is said to be had in this stream.

After entering this narrow valley the mountains are lost to view, hidden by the steep slopes of the river valley, that become less and less lofty as the road climbs. The recent flood played havoc with the road, and about Mile 94 N it runs over the coarse gravel of the river bed, with only temporary bridges over the channels.

About Mile 98 N the valley has become definitely much smaller, perhaps due to several lateral valleys that have come in just below; the stream was much smaller, and low forests of spruce and pine contain little or no poplar.

At Mile 102 N the Relay Station is reached in Summit Pass, at the south end of Summit Lake.

Summit Pass (Mile 102 N to Mile 114 N; July 19, August 28 to September 8)

The pass is at about 4,100 feet altitude. Two little lakes lie in the pass; Summit Lake, about a mile long and several hundred yards wide, and a little lake a few hundred yards across on which the party camped, and where Dr. Raup camped in July to study botany. The pass has a little marsh about the ends of the lakes, and some grass, willow, and dwarf birch meadows along the rills in the pass; its sides are wooded with spruce and pine, with timber line at about 4,500 feet. Above that, to the north, is a narrow band of alpine grassland, and then the grey scree and bare limestone reaches to the 7,000- to 8,000-foot peaks.

To the south several ridges, covered to a large extent with lichens as well as grasses, low shrubs, and some herbaceous plants, must be crossed before the bases of a series of grey, dentate peaks are reached. There is one little lake half a mile long about an hour's walk south of camp, and a little glacier on a mountain perhaps a mile beyond. These ridges are pleasant walking; in September the dwarf birch gave a beautiful russet-orange-brown tinge to the country, and it is an easy walk back amongst the peaks to just below the little glacier.

The forest north of the road was burned in part some years ago, in part recently, and it is on that slope that the pine occur. The slope south of the road has missed the fire, though the larger spruces, 12 to 14 inches in diameter, have been cut during the construction of the road.

The spruce forest is an open stand of slender trees, with branches nearly to the ground. The ground between is tussocky, with much moss and lichens; dwarf birch and willow are scattered plentifully through it, waist to head high, but it is easy to walk through it; bearberry and blueberry bushes are common, and in places there is much grass and sedge; in places mats of Labrador tea are conspicuous.

At timber line the trees decrease in size, dwarf birch becomes dense, and finally the spruces straggle upward in prostrate groups, so that they look like shrubs.

Above timber line in September it was colourful; on the ridges grey lichens were more plentiful than the green and yellow mosses; scattered bearberries with red leaves, dwarf birch with orange leaves, dwarf willows turning yellow, and reddish blueberry bushes made a brilliant scene.

During the stay in September it was cold, with a sheet of ice over the water bucket in the mornings. On September 1 snow covered all the high country, with a thin covering as far down as the camp near the road.

This is about 60 miles north of Tuchodi Lake, a famed big game hunting area, where elk reach their farthest north.

About Summit Pass itself no sheep were found, but small numbers of caribou summer there; deer occur at lower altitudes; wolves are common, and ptarmigan live at the higher altitudes. No whistlers or conies occur.

Birds were scarce in late August, but with the snow of September 1 migrants swarmed. White-crowned sparrows were in every bush, with lesser numbers of Savanna sparrows, and pigeon hawks appeared for the first time. On the higher slopes were big flocks of longspurs, horned larks, and pipits. Cranes were heard going over, and rusty blackbirds, snipe, and five kinds of ducks stopped on the little lake.

Only a little black sucker was to be caught in Summit Lake, according to the men in the army camp.

About Mile 107 N the road comes out on the slope above McDonald Creek, which winds upstream between the bases of the grey peaks that rise 4,000 to 5,000 feet above it.

The road follows down along the side of the McDonald valley until near Mile 114 N it is in the valley bottom, and the high, bare, grey peaks are left

PLATE IV



The little lake and forest in Summit Pass at Mile 104 N.
(Photo by M. Y. Williams.)

PLATE V



. Summit Lake, with the highway bordering it, near the highest point of the road,
4,200 feet at Mile 102 N.



Looking down the valley of McDonald Creek from Summit Pass. In the background are the snow-capped peaks about Muncho Pass.



Above timber line in Summit Pass. A light covering of snow had fallen by September 1. Caribou summered here. In the background Steamboat Mountain shows.

behind. Along its route the forest is at first pine and spruce with aspen gradually coming in. With the decrease in size of the peaks, near Mile 110 N, the hills on both sides of the McDonald have forest to their summits.

McDonald Creek Camp (Mile 114 N; July 19-23, August 28)

Camp was in young mixed forest by a tributary of McDonald Creek. Here the valley was a quarter to a half mile wide, with slopes rising steeply 2,000 feet or more, covered with vegetation to their summit, but with many bare, grey or brown rock faces or land or rock slides.

McDonald Creek is a mountain stream 50 yards or so wide, with a gravel bed many times that width, edged by a sharp cut earth bank. Here and there in the bed are bars on which willows and herbs have established themselves.

Several dashing mountain torrents with boulder-covered beds flow from the hills, though some on the flat valley bottom turn into slower streams with many channels through spruce muskeg. Downstream, the valley deepens and broadens slightly; upstream, some 5 miles or so, the grey, bare peaks of the Rockies appear along the stream. In July patches of snow were common on the peaks, and on the south side of the valley opposite and only a few hundred feet above camp was a sizable patch of snow in the forest.

On the valley bottom close to the river were some limited stands of spruce and poplars, 12 inches and more in diameter, that had escaped both burns and floods. Much of the valley bottom was covered with a mixed stand of young pine, aspen, and spruce up to 20 and 30 feet high; it was rather open with much grass and some shrubbery, and sometimes a little moss. Where drainage was poorer, the low forest cover was more open, spruce was common, and shrubs such as dwarf birch and willow, and sphagnum were conspicuous. On the edge of a marshy stream were willow thickets 10 to 20 feet high, and, in places, patches of spruce muskeg. On the slopes were occasional stands of young spruce, 20 to 30 feet high, with a moss-carpeted forest floor, but more common were younger stands of second growth of pine, spruce, and some aspen, with dead stubs from the last burn showing everywhere. Here and there on the slopes were dense, young pine forest, and higher there appeared to be only low shrubbery.

Large game was scarce in the valley bottom. An old beaver pond near the camp contained white fish and grayling up to 15 inches in length, both of which took a fly well. Harlequin ducks were seen on this pond and bred nearby, as downy young duck were found.

McDonald Creek Camp to Racing River (Mile 114 N to Mile 137 N; July 23, August 28)

To Mile 122 the road follows the right side of the valley, and only a little above the river, with no change in the character of the valley beyond deepening somewhat.

At Mile 122 N the road crosses the broad gravel bed and narrow stream of McDonald Creek and follows the left bank. The valley narrows there to little more than the stream bed. In places open, low aspen stands with grass areas cover most of the hills almost down to the road, and much brown rock outcrops; young aspen forest and regrowth were more common on the hills. At Mile 126 N the road swings around a point of the hills and enters the valley of Racing River.

Ahead and to the right (north) are high, bush- and grass-covered domes and hills, with much grey rock showing through. The road turns west, over the flats along Racing River. These flats are characterized by groves of slender topped spruces 40 to 50 feet high that give a striking silhouette; the hills each side are green with low aspen growth and *Equisetum* (horsetails).

The bridge is near Mile 128 N. Some small trees show on the hills. Only a few miles upstream the mountain peaks, rising bare of vegetation, tower impressively.

Racing River is a swift, shallow mountain stream 50 to 60 yards wide, in a broad bed of coarse gravel. Beyond Racing River the road goes up the gentle slopes of a low saddle, between low rounded hills, with young aspens and much grass and *Equisetum* giving a characteristic yellow-green colour to the countryside. Only here and there are stands of 20- to 40-foot spruce in the flats. Evidently this country has been repeatedly burned. This is said to be deer and coyote country, and horses are wintered here.

Across the low saddle, the road dips into the similar valley of Toad River.

Toad River (Mile 137 N to Mile 159 N; July 23, August 19)

The valley of Toad River, where the road enters it, is much like that of Racing River. Toad River, where the road joins it at Mile 139 N was a 60- to 70-yard, fairly smooth, fast-flowing stream with a fairly well defined course, and less a mountain torrent than McDonald Creek and Racing River.

The following information about Toad River Hot Springs, which must be about 8 miles from the road, was secured from a young engineer at a construction camp at Mile 138 N.

The Hot Springs are situated in the valley bottom on a shelf about 20 yards north of Toad River, and about $1\frac{1}{2}$ miles above the junction of Toad and Racing Rivers. There are about fifteen of them, varying in size from tiny pools to one big enough for five men to swim in at once.

The easiest way to get to them is to go down the right bank of Racing River, ford Racing and Toad at their junction, and then come back up the left bank of Toad River. On a hill north of the junction is a large Indian burying ground with painted fences around the graves.

The road parallels Toad River upstream. To Mile 146 N the valley is broad with rocky, rounded hills on each side, and with grass and aspens. Then it enters what might well be called the canyon of Toad River. With little change in the level of the valley bottom, the hills change to mountains; grey or yellowish rock walls and scree, with only a scattering of spruce and pine trees on their lower slopes, rise several thousand feet close to the road. The river continues the same, but with more tendency to flood as shown by the exposed gravel bars. Immense alluvial fans of gravel come out of small lateral valleys. In its narrower parts the flat valley bottom is only two or three times the width of the stream bed; on these flats are good stands of spruce, and in places pines and poplars, that may push a short way up the slopes before breaking into isolated fringes of dwindling trees straggling upwards. Along the bank of the river itself willow thickets are of frequent occurrence.

The bridge across Toad River was at Mile 154.5 N.

From Mile 152 N to Mile 155 N the trees on both sides of the valley have been burned, and on the north side the burn continues to about Mile 157 N. A local trapper, Tom Mould, told the author that the burn is much more extensive than appears from the road, and that although little commercial timber is involved, it has seriously affected the trapping over a wide area.

Beyond Mile 157 N the valley widens somewhat, and there are a few grassy swamps in the valley bottoms. At Mile 158 N the valley opens into a circular flat with a grass- and willow-fringed lake one-fourth mile wide. The little flat is ringed with grey peaks, some of them snow-capped.

At Mile 159 N the road leaves the Toad and climbs into Muncho Pass.

An Indian, Charlie McDonald, who traps this area, and whose home cabin was near Mile 158 N, said that there were many more lakes up the valley of the Toad, and though not good fur country, it was good "meat country", a fact of more importance to the Indians than the fur.

Muncho Pass (Mile 159 N to Mile 163 N; July 23, August 19)

The road climbs steeply from about 1,500 feet altitude on Toad River to about 3,600 feet near Mile 163 N.

At Mile 162 N the road climbs in a broad U-shaped valley, covered with young forest up to 40 and 50 feet high, composed largely of spruce and pine.

PLATE VIII



Muncho Pass, with the mountains above Muncho Lake in the right background. Sheep and goats lived in these hills. A grizzly bear and two cubs were seen near the spot from which this picture was taken.

About Mile 163 N where the saddle is reached, the grey peaks that back the wooded hills along the road move out and take up their places along the sides of the pass, a mile or two wide here.

Ahead are the series of grey dentate peaks fringing the valley of Peterson Creek that starts in the pass and flows into Muncho Lake. Looking backward, one sees the jumbled peaks across Toad River.

About Mile 163 N the road starts down hill. At Mile 164 N the forest on the west side of the pass has been recently burned and, mostly on the same side, this burn extends to Mile 169 N, from the road to timber line. The road is on the west side of the pass and looking across it one looks over the pine and spruce forests to where they give way to grass, and the bare grey slopes of the peaks about a mile away.

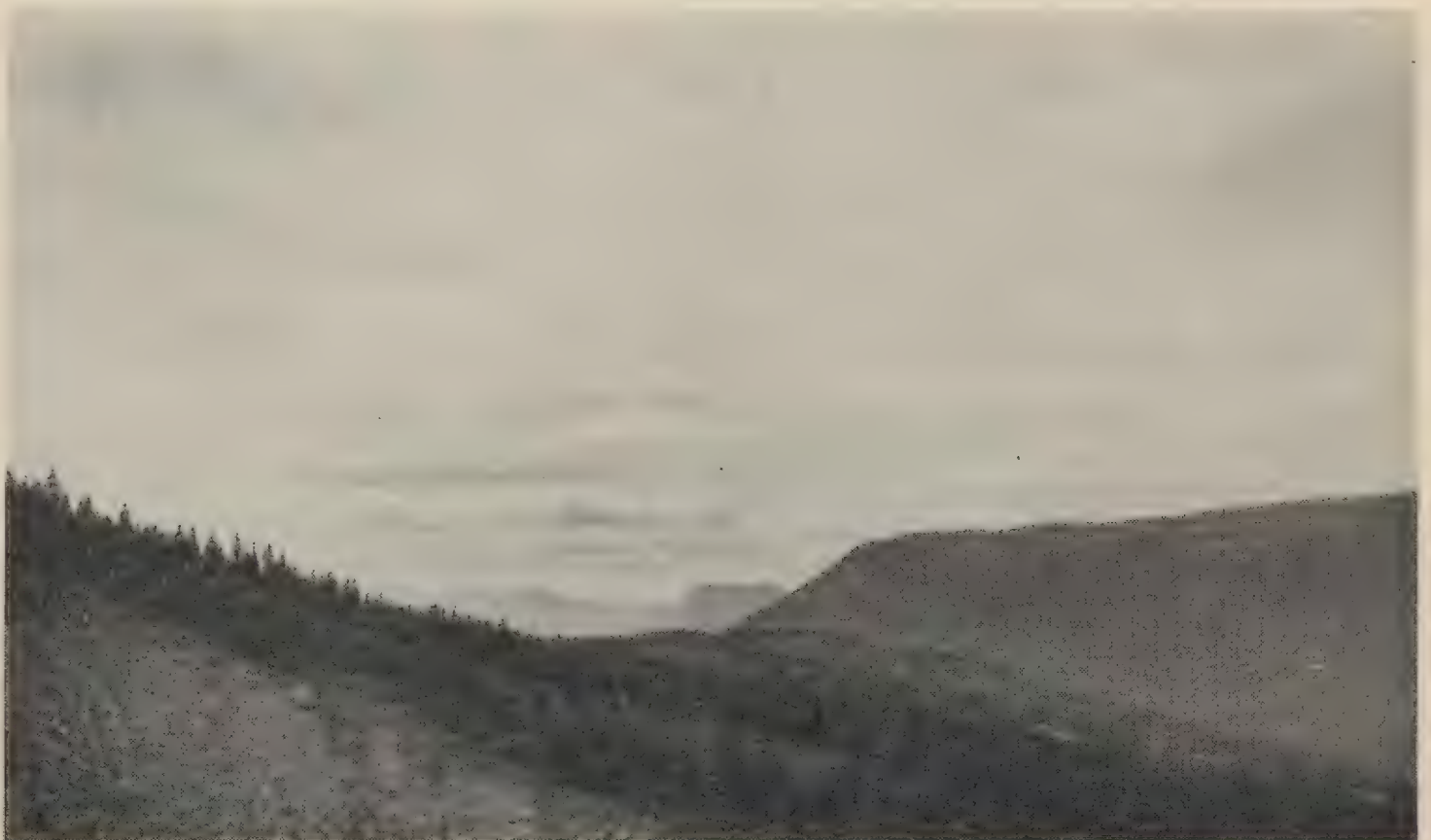
Muncho Pass Camp (Mile 165 N, alt. 3,500 feet; August 24-28)

Camp was situated near the larger of the two little ponds near Mile 165 N on the new road location, not then in use.

The pass here, near its northern end, is a mile or so wide, with a row of peaks each side running to about 7,000 feet; the valley bottom is irregular, with little hills, and coming out from between each pair of peaks is an alluvial fan of boulders. The one at Mile 164 N on the new road location reaches considerable size.

The two little ponds where Peterson Creek begins are just north of the pass; one is a couple of hundred yards long, the other twice that length. About them is a little sedge marsh, and some meadows of willow, dwarf birch, and grass. Just south are some other dwarf birch-grass meadows, one being about half a mile long.

PLATE IX



Mountains overlooking Toad River, as seen from Muncho Pass.

Much of the valley bottom is covered with open pine forest, with trees up to 30 to 50 feet tall. The ground is heavily moss covered, with grey lichens scattered plentifully through it, and with scattered straggling dwarf birch and labrador tea.

Approaching timber line, the altitude of which is irregular, between 4,000 and 5,000 feet, and whose position seems to depend on rock exposure and scree rather than on temperature, the trees decrease in size, the pines are low and gnarled and form dense stands, and stands of dwarf birch also become dense.

Above timber line scant, short grass and other herbs with a few little shrubs make sheep pasture for a few hundred feet only, before the bare grey of exposed rock and scree leading to the peaks is encountered.

Along the alluvial fans, on gravel flats of some age, herbaceous vegetation and low shrubs have established themselves.

Spruce grouse, juncos, and myrtle warblers were common in the forest, Townsend's solitaire along the alluvial fans and at timber line, and in the latter habitat were golden-crowned sparrows.

Grizzly bears came to a garbage dump at Mile 164 N, and three were seen by the author at timber line; sheep are reported from the higher slopes.

Small Dolly Varden trout up to 12 inches long are common in Peterson Creek. Heavy frost occurred here in August, with little pools in the swamps frozen over completely. Despite this, sand flies were very annoying at this camp, the only time during the summer that insects were obnoxious. From local information sand flies can be expected to be plentiful in this area the latter part of the summer.

A trapper, Pete Peterson, had a cabin at Mile 165 N.

Muncho Pass to Muncho Lake (Mile 165 N to Mile 170 N; July 23, August 24)

In this 5 miles the road follows down the valley of Peterson Creek. The road descends about 600 feet; the valley is narrow nearly to Muncho Lake, being

PLATE X



Alluvial fan, favourite habitat of chipmunks, in Muncho Pass. The grey, dentate peaks are characteristic.

only a few hundred yards wide, and soon much of that is occupied by the gravel bed of Peterson Creek, a typical mountain torrent, only a few feet or yards across in dry times but a brawling flood after rains.

The spruce and pine on the slopes increase in extent with the deepening of the valley, the peaks and timber line remaining about the same altitude. At Mile 169 N the burn on the west side of the valley ceases at a point where a scantily forested, yellowish red rock outcrop breaks the slope.

At Mile 170 N the valley spreads out, Muncho Lake showing ahead and a river coming in from the west. Here, the United States Army control station was located.

Muncho Lake (Mile 170 N to Mile 179 N, alt. 3,000 feet; July 23 to August 4, August 24)

This is a beautiful place with a pale blue-green lake 1 to 2 miles wide and 8 miles long, hemmed in with steeply rising slopes capped with bare mountain peaks that reach 7,000 to 8,000 feet altitude. At the head of the lake is a marshy flat through which flows a 20-yard river that enters from the west. The Army Camp is a beautiful site for a more permanent settlement. Wide gravel and boulder alluvial fans come out between many of the peaks.



Muncho Lake; the Highway in the foreground.



Burned forest on the hills back of Muncho Lake camp, Mile 172 N.

Willow and alder, grass and horsetails cover part of the flat at the head of the lake. On better drained parts are limited stands of spruce up to 16 and 20 inches in diameter. The slopes are covered with young pine and spruce forests of fair size. Alpine grassland is extensive, and good sheep pasture. Near the north end of the lake, on its west side, a red conglomerate forms rugged steep slopes and crags with scattered trees and herbs, on which goats live. A short distance up the valley that opens onto the lake at Mile 172.5 N are a series of the peculiar pillar-like geological formations known as "hoodoos".

By late July a great many of the resident birds were already on their way south, but Chipping sparrows were still nesting; a shell duck led her brood across the lake and gulls occasionally visited it. A pair of bald eagles and another of loons had nested about its lower end. In the forests western wood pewees, olive-sided flycatchers, brown-headed chickadees, red-breasted nuthatches, myrtle warblers, and spruce grouse were found. At timber line were golden-crowned sparrows and above it ptarmigan evidently occur, though only signs of the last were seen.

Big game is fairly plentiful, with sheep and goats that may sometimes be seen from the road the most common. Black bears, moose, and caribou tracks were occasionally seen; wolves were common.

Lake trout fishing is said to be very good in Muncho Lake, fish up to 35 pounds weight being not uncommon. The best fishing is said to be in the early spring, just after the ice breaks up, and in the autumn, just before the freeze-up.

Muncho Lake to Liard Crossing (Mile 178 N to Mile 210 N; August 4 and 24)

The road runs along the east side of Trout River Valley to about Mile 194 N, where it crosses the river, a 15-yard stream there, and continues down the west side to Liard River, about 1,500 feet lower than Muncho Lake.

The main valley of Trout River and many of the smaller laterals are typical U-shaped valleys, the result of ice action, and many old cirques, arm-chairs of former glaciers, show from the road. All along the valley, but especially on the lower part, are old benches left by outwash from the glaciers of the ice age, and only partly cut away by present-day streams. Geological evidence of the glacial period is plainly shown here.

Leaving Muncho Lake one crosses some immense alluvial gravel-boulder fans before descending to the river. Young forests of spruce or pine predominate at lower altitudes. Here, on the east of the road, bare scree and rock of the peaks start only a few hundred feet above the road. Soon the mountains are somewhat lower, with low forest or shrubbery and grass to the summits of most of them. But to Mile 202 N, at least a few of the mountains rise to grey bare peaks, and the valley is a steep-walled mountain valley. Along the river flats are some very limited stands of fair-sized spruce, 10 to 12 inches in diameter, mixed with poplar.

In the lower part of the valley aspen becomes more apparent.

North of Mile 202 N, the mountains become lower and the valley becomes broader, with rounded hills covered with young spruce and pine forest with some aspen.

At Mile 210 N the temporary wooden bridge over Liard River is reached.

Liard Crossing (Mile 213 N; August 4-14 and 20-24)

Camp was established in an abandoned construction building on the Highway, near Mile 213 N.

Liard River Valley here is a broad, U-shaped valley a mile or so wide. The river is a 400- to 500-yard smooth- strong-flowing stream, with in places gravel cutbanks 20 to 40 feet high along its margin. The rest of the valley bottom is made up of alluvial river benches, some of which have rich agricultural soil.

On the south side of the stream, looking upstream, mountains rise by easy slopes 2,000 to 3,000 feet above the river, wooded but with occasional bare rock faces showing. To the north of Liard River are a few smoothly rounded hills, 1,000 to 1,500 feet above river level, and downstream they dwindle away to lower hills. Farther north, away from the river, the country is said to be all low hills.

The best forests of the main valley bottom of the Liard are tall, luxuriant stands of aspen up to 15 and 24 inches in diameter, with a few scattered spruces; here and there are small stands of even larger spruces, up to 30 inches through at the butt.

In places the aspens stand in open formation, with much wild parsnip, grass, raspberries, high-bush cranberries, nettles, and fireweed and grass growing

PLATE XIII



Lower Liard River Crossing, Mile 210 N. The "Tropical Valley" lies just behind the shoulder of the hill to the right.

between them; in others they are closely spaced, with sarsaparilla and bunchberry the main plants of the leafy forest floor. The stands of spruce have a mossy forest floor; in places alders and willow are common. Near our camp was an open grassy meadow, once an old beaver meadow but now in part densely grown with grass, which was being cut to feed horses used in the nearby construction camp.

On the slopes above the river the forests are of mixed hard and soft woods in about equal proportions, and are frequently heavily grown with shrubbery. The trees are small. The rounded hill near Mile 212 N, north of the road, is partly grass-covered.

The most interesting feature of this area is the presence of hot springs that have given this part of the valley the name "Tropical Valley" (See below).

Here, the author met Mr. Thomas Mould, whose trap line lies just to the north.

Tropical Valley (Mile 213½ north of Nelson)

The hot springs, that along with the denseness of the vegetation gave to this part of the Liard the name "Tropical Valley", lie about half a mile north of the road.



An old beaver meadow in "Tropical Valley" at Mile 213 N, near Lower Liard River Crossing.
Mule deer wintered on the hill in the background.



An old beaver pond near the "Hot Springs" in "Tropical Valley" near Mile 213 N.
(Photo by M. Y. Williams.)

An improved trail has been put in so that truckers could have the benefits of bathing in the hot springs, and they are well patronized, scores of men visiting and bathing in the pools daily.

The first few hundred yards of the trail leads through the magnificent aspen-birch forest with trees up to nearly 2 feet at the base. Then, a board walk leads 100 yards across an old beaver pond that is on the way to becoming a meadow; 75 yards or more to the east is the old beaver dam, about 100 yards long, and nearby is the old beaver lodge, standing out in the water, with 25-foot spruces growing on it, indicating that this meadow may be 50 years or more old. Though the dam is broken, there is still 3 feet of water in places, and numerous minnows live in it.

PLATE XVI



One of the little tufa-rimmed pools of "Hot Springs" near Mile 213 in "Tropical Valley". (Photo by M. Y. Williams.)

The clayey soil of the pond bottom holds tracks well, and is much trodden by moose that apparently frequent it for its mineral content. Part of the pond has silted in, and grown up to short grasses and sedges, with yellow-flowered shrubby cinquefoil, white-flowered anemone, and other flowers that are found at higher altitudes in the mountains.

Black spruce is encroaching on this beaver meadow, and below it, eastward, is a whole series of older beaver meadows that are growing up to meadows and muskeg spruce and larch. In some of them horsetail (*Equisetum*) has almost taken the place of grass. This series of meadows more or less connects with the meadow on the road at Mile 213 N, also an old beaver meadow, a meadow that served as trappers' gardens.

The author took specimens of shrews, jumping mice, meadow mice, and deer mice about the edges of this meadow; in August, Say's phoebe, solitary sandpipers, kingfishers, and olive-sided flycatchers were found about the pond; moose, black bear, wolf, and porcupine tracks were seen.

Continuing across the gentle slope through young forest and glades, the clumps of tall ferns, wild parsnip, nettles, and alders 6 inches through, give a lush appearance to the vegetation; all grow elsewhere in the forest, but not so luxuriantly as here. This, and the hot springs, has given the name, "Tropical Valley".

PLATE XVII



Cache for moose meat, near Lower Liard River Crossing.

In climbing to the springs one crosses many tiny terraces, hemmed in by tufa. Tufa is the deposit left from the calcium carbonate (lime) in the water of the many little springs that once bubbled here. It makes a rim of rock about the pool, and tufa rims may be seen about the higher pools. A strong smell of sulphur from the mineral water prevails in the air.

The main hot spring with a reported temperature of 125°F., is enclosed by a bath house, built by the army. Summer and winter men on the road stop to bathe here. Snow, it is said, lies right to the edge of the water.

Some few score yards beyond lies the main bathing pool used in summer, a 30-yard pool of pale bluish water in the crest of a little ridge. At one time it evidently flowed away to the west, but the tufa rim built up, and now one looks down over a shrubby slope to a narrow marsh, fringed with alder and forest, in which tall, green, luxuriant rushes and sedges grow. Another trail leads from the pools, along the edge of this marsh, through swampy forest, back to the road.

PLATE XVIII



Aspen forest in "Tropical Valley" near Mile 213 N.

Above the bath house rises a whole series of little terraces, tufa rims holding in pools of cool water a few feet or yards across.

The hill rises beyond, and the whole setting is of a series of springs near the base of a gentle sloping hill, covered with young mixed forest of spruce, aspen, and birch.

Across Liard River the mountains rise higher and are more imposing, wooded, but with bare rock faces near their summits.

Liard Crossing to Smith River (Mile 213 N to Mile 231 N; August 12, 13, 14, 20)

The country from Mile 213 N to 219 N is much the same as that about the Liard Crossing.

At Mile 220 N there is more tall spruce, and a sawmill has been in operation to exploit the good stands of spruce here. It is from here that bridge timbers are cut for use on the road back at least to Mile 165 N.

Between Mile 220 N and 223 N the road passes through the northern end of the Rockies, which dwindle away to hills a few miles to the north. North of the road rise steep grey rock walls, with patches of spruce here and there at their bases and on their summits. To the south of the road, and river, rise steep, rocky, scantily forested and bare rock slopes of several thousand feet.

PLATE XIX



A trapper's cabin in "Tropical Valley" near Lower Liard River Crossing.

Beyond, from Mile 223 N to Mile 230 N, the mountains are left behind, and the road rises somewhat over river terraces. There is a view upstream over Liard River and wide sand bars appear; the valley is a mile or two wide with river terraces of various levels, and margined with rounded hills rising a few hundred feet above the stream. On this stretch of road the forest is predominantly young spruce.

Near Mile 231 N, the descent of a short steep grade leads to Smith River.

Smith River (Mile 231 N; August 12, 13, 14, 20)

Besides passing Smith River on August 14 and 20 the author went up to the falls, visiting Smith Valley airport and Old Fort Halkett on August 12 and 13.

Smith River is a 60-foot, rapid, sparkling stream with a 4-mile-an-hour current, in a rather flat, wooded valley. About a mile upstream rises a triangular, wooded hill. At the foot of this hill falls of considerable beauty

are reached by a 40-minute walk along the west bank of the stream. The greater part of the way the trail along the stream is over flat terraces 10 to 40 feet above the water. Most of the country is covered with open forest of spruce and aspen 20 to 50 feet high, with much grass in the undergrowth, but there are some beautiful spruce stands with trees up to 24 inches diameter and with a thick carpet of moss on the ground.

Near the falls rise low hills. The falls have been formed by the stream cutting deeply into a black shale, downstream from a harder grey limestone. Now the water cascades over the limestone barrier into a small canyon cut into the shale. The falls, with a good flow of water about 50 feet wide, are about as high, with one straight fall, the lowest, of 25 or 30 feet.

This stream is said to be an excellent fishing stream, yielding grayling, Dolly Varden trout, and jackfish.

The one-way road to the Smith Valley airport leaves the Highway at about Mile 233 N. The first 10 miles are in very bad shape, practically impassable for a touring car even under favourable conditions. From Mile 1 to Mile 4 the road follows along a gentle slope, through young mixed forest, Mile 4 to Mile 7 the road runs close to the river; the forest has been burned this year; here are a few low rock bluffs. From Mile 7 to Mile 10 the country is forested, and along the river is some spruce up to 18 inches in diameter. The river is a meandering, rather slow stream, with willow thickets along the margin in many places.

From Mile 10 to Mile 23 the broad, shallow river valley shows burn to the horizon on each side. Evidently, the burn was about 20 years ago. Now the regrowth is dense pine and aspen. Smith Valley airport, about Mile 25 from the Highway, is in pine country. Much of the pine is 6 to 10 inches in diameter.

The airfield itself is on a little plateau, and from it one gets a good view of the country. Smith River flows in a shallow valley north and south; to the east rise very low, rounded, wooded hills. On some, old stubs show indicating that the country has been burned and that the pine covering them is second growth. To the west are low, distant, pine-clad hills.

Near the construction camp here is a little lake, a quarter of a mile or so across, with a little sedge marsh at one end.

The party met and talked with the trappers from Tobally Lake to the north of here, who say the country of low, jack pine hills is similar to that farther north on their trap lines.

Smith River to Coal River (Mile 233 N to Mile 250 N; August 14, 20)

The road runs along low, level river terraces, swinging southward to overlook the Liard only at Mile 242 N, where log jams and gravel and sand bars show along its course. This country is covered with spruce forest, much of it with 30- to 40-foot trees, but with some taller stands; especially about Mile 244 N, where a sawmill is located, there is much spruce 12 to 24 inches in diameter.

About Mile 247 N the road climbs to a higher terrace, covered with young pine forest, much of which is burned between Mile 247 N and 249 N. Approaching Coal River, reached at Mile 260 N, the country is covered with young spruce forest.

Coal River is a 50- to 60-yard, deep, swift stream. The road crosses it near the junction with Liard River where there are wide sand bars. The river flows in a shallow valley, with low spruce and aspen near the road, and upstream larger mixed forest appears on the ridges. A 3-foot seam of coal is said to cross the river some miles upstream, and blocks of coal are brought down the river in flood periods and lodged on the river bars, giving the river its name.

Coal River to Irons Creek (Mile 250 N to Mile 311.5 N; August 14, 20)

To Mile 254 N, the road crosses a terrace covered with 30- to 50-foot mixed forest; then comes a descent to a lower terrace, on which there is a stand of tall spruce 70 to 80 feet high, extending toward Liard River.

From Mile 256 N to Mile 260 N, where the road comes out at the Liard, the country is all young mixed forest and regrowth. At Mile 255 N a glimpse of the Liard shows rapids, and rocks sticking up in the river.

About Mile 264 N, the river swings away to the south, between steep, thousand-foot banks nearly forming a gorge, though the slopes are still wooded with conifers, with occasional grey rock faces showing.

The road climbs a thousand feet or so, until at about Mile 270 N it is on top of a ridge, in a country of big, smoothly rounded ridges, covered with spruce and pine 30 to 40 feet high, and only here and there are a few aspens. There is very little water.

Not until Mile 288 N is the river reached again. Both north and south of the river here are rocky, isolated mountain masses.

The road, now lower along the river, on the richer soil of the river terraces runs through forests with much spruce and aspen as well as some pine stands. The largest trees are seldom over 8 inches in diameter, and most are much smaller.

At Mile 296 N the road comes out into an old burn with pine regrowth that reaches at least to Mile 301 N, with a few unburned islands of forest.

At Mile 298 N is a lake, about a mile across, close to the road. A beautiful example of a beaver dam about 50 feet long, and $3\frac{1}{2}$ feet high across its outlet, is within 100 yards of the road; a grass-sedge, marshy margin up to 20 to 50 yards across fringes it in places.

From Mile 298 N to 311.5 N the country is hilly; Contact Creek, a stream a few yards wide in a narrow valley with large spruces, is crossed at Mile 305 N, as well as a little rill at Mile 304 N, and another at Mile 309 N.

Irons Creek (Mile 311 N; August 14-20)

This is a sparkling, gravelly, 20- to 30-foot stream, fringed with alder and grass, in a narrow valley bottom.

The valley walls rise steeply on the west nearly 700 feet, with young pine and aspen and mixed forest.

At Mile 313, near the top of the climb, is the abandoned Army Engineers camp. Just back of it is a pretty little lake, perhaps a quarter mile long, without inlet or outlet, set in the hills, with a narrow sedge-bog margin. Here were found black-throated loons, a kingfisher, and a few mallards, apparently all migrants. There seemed to be no fish, though water insects were abundant.

Irons Creek to Hyland River (Mile 311 N to Mile 323 N; August 16, 17)

Big, rolling ridge tops separate the two streams. The forest is young pine, spruce stands of the muskeg type, and aspen in some places of nearly pure stands; in others mixed forest that sometimes contains much birch; alder undergrowth is a feature. In the northern part of this area is some low, dense regrowth of aspen 10 feet high, with much alder in it.

At Mile 315 N is a 20-yard spruce and alder bog run with much standing water, and some running water. At Mile 317.5 N is a bog stream a few yards wide, with little or no current; half a mile farther is a quarter mile open bog to the right, through which the stream runs.

• On the hill to the right shows a characteristic feature of the forest—patches of regrowth interlocking with forest.

At Mile 319 N, one crosses the highest point, and gets a good view of the big ridges above the Liard 20 miles or more to the east; to the west the view

extends over wide lower ridges along the Liard Valley, fading into the blue distance, where one gets the first view of the Cassiar Range, a rugged range, with snow fields, where the caribou summer and grizzlies and whistlers live. Later, this range is seen from several places.

Beyond this, the pine forest is almost park-like in places with good camp sites but no water.

The descent to Hyland River is steep, with earth slides a problem that will occur each spring, and after rains for some years.

Hyland River (Mile 323 N; August 16, 17)

A deep, 75-yard stream with a 3- to 5-mile current. Upstream, its valley is flat bottomed, perhaps a mile wide, with steep valley banks rising 500 to 1,000 feet, nearly bluff-like. Upstream show gravelly edges of subsidiary river terraces in the valley. Far in the distance rise low hills. The stream with sand bars as wide as itself meanders through the valley bottom, the latter clothed with mixed young forest containing much aspen, with small spruce stands of fair sized trees some miles upstream.

The valley narrows to a quarter of a mile where the road crosses; and then broadens to lose its western bank in that of the Liard Valley.

Hyland River to Lower Post (Mile 323 N to Mile 336 N; August 16, 17)

Rising but little on the river terraces, one is soon in a park-like pine country with trees 30 to 45 feet tall and 6 to 8 inches diameter.

Two miles north of the river was the garbage dump of the bridge building company. The party found eight big black bears, seventeen ravens, and a few whiskey jacks around it one evening.

To the right, edges of occasional flat-topped river terraces are conspicuous in being treeless, and the shrubby vegetation covering them being dotted with yellow, apparently clumps of early turning leaves.

At Mile 327.5 N, on a crest is a beautiful view of great rolling hills to the north and south.

Mill Creek, Mile 334 N, is the first running water since the Hyland. It is a slow stream a few yards wide in a small area of dense spruce. Just west of the creek a portable sawmill had been operating, and probably a limited supply of 14- to 18-inch logs was taken out.

Soon, the party arrived in aspen-spruce-pine forest that extends to Lower Post.

Lower Post (Mile 336 N; August 16, 17)

A Hudson Bay Company sign on the road marks where we take the side road several hundred yards in to the Liard, and the post that sits atop the bank. It is on a privately owned area, surrounded by Indian reservations. A half mile below is the mouth of Dease River.

The Hudson Bay Company store, warehouse, residence, the Taku Trading Company, a new hospital under construction, and perhaps a dozen other buildings (all log except the new hospital) with roofs of paper, shingles, or sod, form a line facing the river, about 20 feet from the bank that drops sharply 30 feet or so to the stream. The Mission is somewhat withdrawn, and quite the most imposing building of the lot. About half a dozen Indians are camping in white canvas tents just east of the post, and several unoccupied Indian cabins stand just west of it. The Indian graveyard is just west of the post.

The Hudson Bay Company and the Mission have good, small gardens.

Lower Post to Watson Lake Relay Station (Mile 336 N to Mile 352 N; August 17)

The road crosses sandy flats and winds around the bases of bluffs on the side of the Liard Valley. The several types of forest, aspen, pine, spruce, and mixed forest and second growth, cover most of the country. None of the forest is of large size.

At Mile 338.5 N one can see out over the country ahead, and at Mile 340.5 N the Cassiar Range shows again to the west; in places the tops of the steep bluffs that mark the course of the Liard can be followed.

At Mile 342.5 N the view includes the lower end of the canyon of the Liard, the first place at which Liard River can be seen after leaving Lower Post. About Mile 344 N the road runs out across a pine flat. At Mile 345 N is a stream a few yards wide, with a wide sandy shore upstream; downstream it changes to a spruce bog; shortly, to the north of the road, is a quarter mile of grassy bog, and at Mile 345.5 N, a pond one-fourth mile long. At Mile 345.5 N is a small rill. At Mile 347 N the road climbs to the top of a terrace with a view overlooking the Liard Valley and the west end of the canyon.

PLATE XX



Camp and truck at Steamboat Mountain camp.

At Mile 348 N the road is near the edge of the river terrace, so that through the park-like pines, 40 feet tall, an extensive view is obtained. Beautiful camp sites are common, but again there is no water.

At Mile 348.5 N is a 2-yard stream. A sawmill has operated here, indicating better timber nearby than the small pine and spruce visible from the road. At Mile 349 N is a quarter mile of shrubby bog, bordered with 40- to 50-foot spruce stands.

Much low pine regrowth flats occupy the country now.

At Mile 351 N is a lake, apparently of irregular shape, but a mile stretch of water can be seen at one time.

At Mile 352 N is a quarter-mile pond near the road, and very close to the Relay Station at Watson Lake.

MAMMALS OF THE AREA

This is primarily a fur country, supporting a scanty population of white trappers and a number of bands of Indians, all with large registered trap lines, and a few trading posts. Costly furs, such as marten, lynx, and beaver bulk large in the fur catch. Though this area lies somewhat east of the best known big game hunting areas, where grizzly bear, moose, caribou, sheep, and goat are the attraction, all these animals occur along this section of the Highway, and have contributed to the food supply of the trappers and their dogs. Lately, however, some of the trappers have been importing mash for their dogs.

This area is noteworthy in having marten common in parts of it; fisher are still a regular item in the animal catch. The British Columbia fur laws are universally praised as giving a man exclusive trapping rights over a large area, his registered trap line, and an interest in conserving the supply of fur bearers for future harvesting.

PLATE XXI



Mammal specimens out to dry.

As species, many of the forty-four mammals recorded are wide-ranging across Canada, but some typical western species, such as mountain sheep, goats, hoary marmots, pikas, and pack rats, occur.

Some of the more interesting results of the mammal work was the recording of the skunk, cougar, pack rat, and mule deer on the periphery of their range, and the fact that while the Athabasca red-backed mouse occurs at Mile 64 north of Fort Nelson, Dawson's red-backed mouse replaces it 40 miles farther north.

In addition to the author's field observations, much information obtained from trappers encountered during the summer is included. The collections made have been studied in connection with the material in the National Museum. Some cases of identification could not be decided and are left open; a few others will be treated in forthcoming reviews.

ANNOTATED LIST

1. **Cinereus Shrew.** *Sorex cinereus cinereus* Kerr

By far the commonest shrew, specimens being taken from Muskwa to the Lower Liard Crossing camps. Not found at several localities, and compared with mouse populations, only fairly common even where found.

This shrew inhabited mossy spruce forest, poplar forest, grassy meadows, and damper, mossy spots in burned over country.

Shrews, of which this is the most common and widespread species, are said to sometimes injure the fur of animals caught in traps.

Specimens were taken as follows: Muskwa River, 1, September 17; Steamboat Mountain, 7, September 9-15; Muncho Pass, 1, August 27; Lower Liard River Crossing, 8, August 9-24. This form has been recorded from Peace River area through northern British Columbia and southern Yukon to Alaska.

2. **Dusky Shrew.** *Sorex obscurus obscurus* Merriam

Not common; recorded seven times from stations near Steamboat Mountain to the Lower Liard River Crossing in much the same habitats as the cinereus shrew. It was found in heavy, mossy spruce forest, in grassy regrowth country, in grassy meadows, and above timber line in shrubby valleys and about grass- and moss-grown rock slides.

Specimens were taken as follows: Steamboat Mountain, 1, September 13; Summit Pass, 3, August 31, September 7; Muncho Pass, 1, August 25; Lower Liard Crossing, 2, August 12, 25.

3. **Water-shrew.** *Sorex palustris* subsp.

None was seen by the writer, but from local accounts it evidently occurs sparingly in the Lower Liard Crossing area at least. The race *navigator* has been recorded for central and northwest British Columbia (Jackson, 1928, No. Amer. Fauna, No. 51, p. 177), but Cowan (1939, Occ. Papers B.C. Prov. Mus., No. 1, p. 70) records the race *palustris* for Peace River area.

4. **Pigmy Shrew.** *Microsorex hoyi intervectus* Jackson

This tiny shrew was found only at Irons Creek camp, Mile 313 N, where three were taken. No other shrew was found there.

One of the specimens was taken in the sedge along the lake margin, one in the alder fringe along the lake, and one in somewhat mossy, young mixed forest.

This form has been recorded as far northwest as Dease River (Jackson, op. cit., p. 207). No specimens have been recorded for the Yukon, though another subspecies *eximius* occurs in Alaska.

5. **Bats.**

Occasional bats were seen about Lower Liard Crossing in August. They were flying about the forest glades in the dusk. None being secured, an attempt to allocate them to species would be little more than a guess. Apparently more than one species was seen.

6. **Black Bear.** *Ursus americanus* subsp.

Common along the Highway from Blueberry to Watson Lake. Probably the population is abnormally high due to the animals gathering to feed about garbage dumps. Nine were seen at one time about the garbage dump at Blueberry Relay Station, Mile 53 J, and eight at one time at the garbage dump near Hyland River. The author was told that as high as eighteen had come together at a garbage dump near Lower Liard Crossing.

Black bears have become very tame, and the soldiers and truckers find them one of the few bright spots of interest along the Highway. They feed them, pet them, and wrestle with them in a manner that passes the indiscreet and reaches the foolhardy. And yet only one man, a trucker, at Hyland River, was injured, having his hand torn while feeding a bear. At one camp dump the sign was posted: "For our safety do not molest the bears".

Bears were kept as pets at camps, until ordered released; a shame, for they were well cared for, and after getting to know bears personally and at first hand, the men are less inclined to shoot and leave them to rot in the forest.

A few have been shot during the construction of the Highway, but rather successful efforts have been made to suppress such actions.

The local trappers pay little attention to black bears beyond shooting an occasional bear for their needs; for meat or for the hide for their beds. The skin is too bulky, and entails too much work in the preparation for market.

However, the very immunity from attack and the abundance of food has caused black bears to become so bold about camp as to enter tents in search of food, and so brought about the destruction of the individuals concerned.

In the South Pine River country and to the south this habit of the black bear has caused them to be looked on with disfavour, and the same may come to be true here.

No specimens were collected.

7. Grizzly Bear. *Ursus* species?

From reports of local trappers the grizzly is fairly common at least from Summit Pass to Lower Post, in the higher, less heavily timbered country; occasionally seen on Buckinghorse River. The writer saw only three, a female and two cubs, in Muncho Pass at timber line on August 26; Dr. Holland stated that his packer saw one adult 25 miles up Sikanni Chief River in July. Mould tells that in the lower, wooded country along Liard River tracks are seen only occasionally in the autumn.

From the many accounts from local trappers, and the author's own limited experience, it appears that grizzlies in this area have not learned to fear man. If they hear a man coming, they may or may not flee. If the man comes close, they may or may not charge, and as far as the man is concerned, these charges seem unprovoked. Sometimes, after a close approach, a matter of feet, the bear may only carefully inspect the man, and then go away.

However, details were gathered of three apparently authentic cases in the vicinity of Lower Post in recent years in which men had been injured by grizzlies. In two other instances, only the coolness of the old trapper concerned saved him from a mauling.

The local trappers apparently leave grizzlies alone unless they come upon the bears at close quarters.

The grizzly must now be considered a dangerous beast, given to unprovoked attack from the human viewpoint. Perhaps, with more contact with civilization it will learn shyness.

8. Marten. *Martes americana* subsp.

Not seen, but the following information from trappers:

Buckinghorse area: fairly common; their furs each year bring in more money than those of any other fur bearer, but not as many of their pelts are taken as of some other species, the fox for instance.

Tetsa River area: fairly common.

Country north of Lower Liard Crossing: common.

Upper Smith River: a jack pine country, marten not common.

Lower Post area: not very good marten country, mostly pine; marten not common.

Marten are said to favour spruce country, to be wide ranging, and easily caught.

Under the present registered trap line system the status of the marten is good, and promises to remain so. The one danger to marten is that with the opening of the Highway more people will come in; trap lines might be reduced in size, more people would trap, and the marten would decrease in numbers. A closed season on marten alone would be of little avail as marten, easily trapped, will fall into traps set for other animals. Special marten sets are made and scents used, not only because they are best for marten but because they are less likely to take other less valuable animals.

The salvation of the marten population is large trap lines; if these are ever broken up, the only answer is large areas closed to trapping.

No specimens were secured. Cowan (op. cit., p. 73) refers the Peace River animals to *actuosa*, but Swarth (1936, Jour. Mammal., 17, p. 401) did not decide on the status of Atlin material.

9. Fisher. *Martes pennanti* subsp?

Not seen; the following information from trappers:

Buckinghorse area: scarce, only one taken in 13 years, though the trapper here speaks of people all around taking two to four yearly. This is mostly high country, and fisher seem to prefer lower terrain.

Country just north of Lower Liard Crossing: not uncommon.

Upper Smith River: scarce.

Lower Post area: not uncommon.

The opinion of trappers interviewed was that a trap line, which may be up to an estimated 1,800 square miles in extent, yielding two or three fisher a year had fisher as common as they are anywhere. They are reported to inhabit the lower country that would be more accessible and this might work against their numbers. They apparently were wide-ranging, solitary animals and heavy populations never attained.

The marten and fisher often go together; that is they occur in the same areas, and prefer the same habitats, but this appears to be true only of the lower country; in the higher country fisher are scarce, even where marten are common.

Many, perhaps most, fisher are taken in sets not especially for them, but in sets for other animals. The remarks about conservation made under marten apply here also.

As elsewhere, fisher here are said to prey on porcupines.

Though in recent years small females have brought up to \$100 to the trapper, large males have sold for as low as \$12, and one trapper spoke of selling three skins for \$50.

10. Northern Short-tailed Weasel. *Mustela cicognanii richardsonii* Bonaparte

A common, widespread species. All the trappers interviewed said the weasel was common, but in a country of valuable fur bearers, little attention is paid it. They are bold animals, coming into cabins and tents. At Summit Pass one came into the tent and carried away a green-wing teal and several specimens from within a few feet of where the author was sleeping. Later, this weasel was collected. At Steamboat Mountain, two came about the tent in the evening, both were collected; and at Liard River Crossing one was seen in the clearing by an old trapper's cabin, one afternoon.

In McDonald Creek Valley five specimens were taken in rat traps, within 100 yards of camp, in 3 days.

Measurements of these specimens are as follows: male, total length, 305, 310, 326, 340; tail vertebrae, 87, 92, 93, 95; hind foot, 40, 42, 45.5, 46; female, total length, 245, 246, 251, 253; tail, 66, 68, 70, 72; hind foot, 33, 33, 34, 35.

On the basis of their large size these specimens are referred to *richardsoni*. Cowan (1939, Occ. Papers B.C. Prov. Mus., No. 1, p. 74) recorded *cicognanii* from Peace River area.

None of the trappers interviewed by the author had seen the least weasel nor the long-tailed weasel in this area. The former has been recorded in Peace River area by Cowan (*loc. cit.*), in the Atlin area by Swarth (1936, Jour. Mammal., 17, p. 401), and the National Museum has a specimen taken at Ross Lake, Y.T., 1908, so it may be expected. The long-tailed weasel has been recorded as far north as Peace River area by Cowan (*loc. cit.*)

11. British Columbia Mink. *Mustela vison energumenos* (Bang)

Not seen; the following information is from trappers:

Buckinghorse River: scarce, not a mink country.

Country north of Lower Liard Crossing: scarce, not a good mink country, but occur along Liard River itself.

Upper Smith River: common (note, this is a good fish country, but poor in marten).

Lower Post area: fairly common.

The abundance of mink seems to depend on the abundance of fish.

Many of the furs taken, even in January, are said to be "singled" or "hooked".

12. Wolverine. *Gulo luscus* (Linnaeus)

Not seen; the following information is from trappers:

Buckinghorse River trap line: too common, one or two taken yearly; they destroy \$200 to \$300 worth of fur yearly; sometimes an animal is taken in a No. 1 marten trap, in which due to the elevated position of the trap they are unable to do much pulling, but they may chew through the chain.

Muncho Lake area: tracks of one or two animals are seen each year.

Country north of Lower Liard Crossing: tracks of only one seen in 6 years, and that one was trapped.

Upper Smith River: four or five are taken each year; they give less trouble to the trap line in respect to taking fur than do wolves.

Lower Post area: a few occur, but they give little trouble to trap lines, as they are trapped when they appear.

The indifference of most of the trappers to this animal, as a robber of traps and caches, and their calm assumption of catching it when it comes about, is in striking contrast to its book reputation. Possibly the wolverine's disposition varies with the locality, or possibly it is a case of "giving a dog a bad name".

13. Otter. *Lutra canadensis* subsp.?

Not seen; the following information is from trappers:

Buckinghorse River: not an otter country, scarce.

Country just north of Lower Liard Crossing: not uncommon, but few taken.

Upper Smith River: present, sometimes seen playing, few taken as they are hard to catch.

Lower Post area: uncommon.

Apparently this is not good otter country, though the animals occur throughout the area. The difficulty of catching and preparing them is such that with some trappers the time is devoted to furs that give better return for the time spent.

14. **Great Plains Striped Skunk.** *Mephitis mephitis hudsonica* Richardson

Not seen, the following information is from trappers:

A skin taken at Blue Lake, near Tuchodi Lake, about 1941, and two skins taken near the junction of Liard and Nelson Rivers about 1933.

This evidently marks the extreme northwest limit of the range of the species.

No specimens were taken, but Cowan (op. cit., p. 75) records this form as of regular occurrence in Peace River area.

15. **Red Fox.** *Vulpes fulva* subsp.?

One captive red fox was seen at Trutch; the following information is from trappers:

Buckinghorse River area: good fox country.

Country just north of Lower Liard Crossing: fairly common; their numbers vary with those of the rabbits.

Upper Smith River: fox not common; one cross and eight reds were taken by two men in the winter of 1942-43.

Lower Post area: not very plentiful, McDonald took one cross and one red fox last winter.

Cowan (op. cit., p. 75) refers the Peace River animals to *V. f. abietorum*; Swarth (op. cit., p. 401) does not venture to allocate a single skull from Atlin to species.

16. **Coyote.** *Canis latrans* subsp.?

None seen nor heard, though tracks seen in Summit Pass in September were probably of this species. The following information is from trappers and United States Army men:

Trutch: an Indian brought a skin to the Army post last winter (1942-43), and a soldier, mistaking it for a silver fox, offered him a fancy price for it, which was accepted.

Toad River: plentiful in this area of open country where horses winter: as many as thirty have been taken in a winter.

Country just north of Lower Liard Crossing: in 6 years tracks of only two have been seen, in the spring of 1943.

Lower Post area: not plentiful; it is held here that the coyote entered the country from the south, following the men trailing horses through to the Yukon, about 40 years ago, and feeding on dead horses.

The northwestern coyote has been described as *incolatus* Hall, and it is to this form that Swarth (op. cit., p. 401) refers Atlin specimens; Cowan (op. cit., p. 76) refers Peace River specimens to *latrans* Say.

17. **Timber Wolf.** *Canis lupus columbianus* Goldman

Fairly common to common from Buckinghorse River to Lower Post at least. The author found tracks fairly common near the garbage dump near Muskwa at Mile 252 J; a few at Steamboat Mountain and Summit Pass; not uncommon in McDonald Creek and Muncho Lake, and common in the Liard valley. Wolves were heard to howl on two nights at Muncho Lake in early August.

The following information is from trappers:

Buckinghorse River area: common, too much so; bands up to sixteen in number have been seen; occasional white and black wolves have been taken.

Lower Liard Crossing area (immediately to the north): wolves common; colours may vary from black to white.

They run in packs, especially in late winter; when rabbits are plentiful they eat many of them; they also kill many moose, and about Muncho Lake many sheep; at one sheep lick on Trout River the author was told of there

being an estimated 100 sheep skulls scattered about, representing wolf kills over a period of years; the trapper here told of finding a dead wolf, much emaciated, that still had part of a snare about its neck, and was completely filled with porcupine quills from head to tail, and these had apparently caused its death; wolves are taken in both snares and traps, and are less shy of traps than wolves farther south. However, little effort is made to secure wolves, except when bothering traps, as the time and trouble involved is more profitably spent on more valuable furs.

Upper Smith Valley: common, difficult to catch; traps are used; two men caught only two last winter; they cause more loss by destroying fur in traps than do wolverines.

The bookkeeper at the construction camp at Smith Valley airport said that wolves were often seen about the camp during the winter of 1942-43.

Coal River area: Mr. Mission of the construction camp at Mile 156 stated that wolves were common; they were frequently seen along the road by truck drivers, and had often come into camp.

Lower Post area: very common, and more of their tracks are seen on river margins than are those of hoofed game. They are hard to catch, but some are taken in both traps and snares, and some are shot; the blue or black phase predominates. The wolf is more destructive to fur held in traps than is the wolverine. Moose are scarce in this area, and the abundance of wolves is blamed for this.

On Toad River Dr. Williams found wolf droppings filled with stout porcupine quills, and Dr. Williams says that trappers on South Pine River claim wolves regularly eat porcupines.

From measurements and sketches of tracks, it appears that wolves north of Summit Pass are considerably larger than are those to the south of it.

No specimens were taken, but this area falls within the range of *columbianus* (See Anderson, 1943, Jour. Mammal., 24, p. 387).

18. Northern Cougar. *Felis concolor* subsp.?

Not seen, but the following information is from trappers:

Buckinghorse River: one set of tracks seen in the snow several years ago.

Tobally Lake: one set of tracks was seen in the snow several years ago.

Big Muddy River: one taken by an Indian several years ago. The skin was hung in the Hudson Bay Company store for some time, and several trappers told of seeing it.

These records of tracks are probably correct, indicating stray wandering individuals; the Big Muddy record is certainly correct, and is the most northerly record of the species. Its rarity here on the northern limit of its range is indicated by the fact that the Indian who caught it did not know its identity.

19. Canada Lynx. *Lynx canadensis* Kerr

(Note that the singular of Lynx, according to custom here, is Link.) Not seen; the following information is from trappers:

Buckinghorse River area: one of the main fur animals.

Muncho Lake area: about 1937 one trapper took seventy-five in a winter.

Lower Liard Crossing (area immediately north): lynx are on the increase here.

Upper Smith River: one of the main fur catches; the winter of 1942-43 two men took about forty skins.

Lower Post area: one of the main fur animals; fairly plentiful at the present time (1943).

Lynx numbers fluctuate with those of the rabbits; where there is little fluctuation in the rabbit populations the lynx population remains fairly steady.

20. Yukon Woodchuck. *Marmota monax ochracea* Swarth

One collected in the glade in poplar forest at Lower Liard Crossing, Mile 213, a glade that had been a beaver pond, then a beaver meadow, then a trapper's garden, then a wild hay and bramble meadow; finally part of it was turned into a tennis court.

Trappers told the author of seeing woodchucks at Old Wives Lake, near Mile 200 N, and that they occurred occasionally through the country north of Lower Liard Crossing, appearing in the trapper's garden.

The specimen collected compares better in its pale colour and in its slender skull with a specimen of *ochracea* from Teslin Lake than with specimens of *canadensis* from Manitoba.

Cowan (1939, p. 77) records *canadensis* from Peace River area.

21. Hollister's Whistler. *Marmota caligata oxytona* Hollister

Not seen; trappers and other persons supplied information as follows:

Dr. Holland found many whistlers in the high country about 25 miles above the road on Sikanni Chief River.

The McDonald Indians report that whistlers occur on the mountains to the west of Muncho Lake.

Whistlers are also reported from the Caribou Mountains and the Beaver River Mountains, to the north of Lower Liard Crossing, and in the Cassiar Mountains.

For a review of this species See 1934, Can. Field-Nat., 48, pp. 57-60.

22. Northern Little Chipmunk. *Eutamias minimus borealis* (Allen)

Common near Muskwa River, Mile 252 J, and in the vicinity of Steamboat Mountain.

Specimens were taken as follows: Muskwa, 2, September 16; Steamboat Mountain, 1, September 14.

23. Yukon Little Chipmunk. *Eutamias minimus caniceps* Osgood

Common in Summit Pass, McDonald Creek Valley, Muncho Pass, and Muncho Lake; absent from the heavily wooded country about Lower Liard Crossing, but one seen by Dr. Williams in the sparsely wooded hills 8 miles to the northwest; at Lower Post several were seen about the settlement. One was gnawing open a sack of flour left by the door of an Indian's cabin; soldiers from Watson Lake said chipmunks were common there.

This species favours the rocky, sparsely wooded country. The stony margins and bars of mountain torrents on the rocky alluvial fans that spread out from between the mountain peaks, and here and there bear herbaceous vegetation, scattered shrubs, and trees, seem favourite habitats. In Summit Pass one was found several hundred feet above timber line.

Except in Lower Post the species was quiet and very shy. At the Muncho Lake camp one frequently fed about the camp clearing, but was rarely heard, and always dived for shelter at anyone's movement. A number of engineers from various construction camps, however, spoke of making pets of the chipmunks frequenting their camps.

Specimens were taken as follows: McDonald Creek, 2, July 21, 23; Muncho Pass, 2, August 26; Muncho Lake, 1, July 26; mouth of Dease River, 1, August 17.

The northeastern end of the Rockies seems to be the southeastern limit of the range of this form. Most of the above specimens compare better with Teslin Lake specimens than with those from Wood Buffalo Park, but are slightly intermediate. However, occasional specimens were seen, and one was taken at Muncho Pass, that are more brownish than the others, and individually would be referred to *borealis*. But in naming the populations they should be referred to *caniceps*, though with a tendency toward *borealis*.

24. Red Squirrel. *Tamiasciurus hudsonicus* subsp.?

A common animal over all the area studied, from Trutch to Watson Lake. It is commonest in spruce forests, the cones of which provide a staple food; less common in mixed forest, and in pine stands, but still fairly common to common in them; and to the author's surprise it was found that this squirrel occurred in burned over areas, where only aspen second growth was coming up.

More than four hundred of these fur bearers were taken as part of the general catch of one trapper last year, 1942-43. Though they have a fur value (last year's skins were said to have yielded the trapper about 30 cents each) only some of the trappers bother with them, beyond the ones that get into traps set for other animals. Despite the money value of the pelt, the squirrel is considered a pest by some trappers, in that it comes to meat baits, and gets caught instead of some more valuable fur.

The taking of squirrels for fur has had a marked change on their habits. On trap lines where squirrels have been trapped for fur, the remaining animals, though still fairly plentiful, are shy, quiet animals, rarely heard, and when seen are usually streaking for cover. At one camp in such an area, a squirrel often visited the camp area; when all was still it crept as quietly as a mouse through the shrubbery, never vocal, never climbing about the tents, and quick to retire when anyone moved. How different was the squirrels' behaviour at camps in areas where they were not trapped; their chattering and trilling rang out, even from the ridge poles of the tents, and when disturbed they sat up and scolded.

Specimens were taken as follows: Muskwa River, 1, September 16; Steamboat Mountain, 2, September 10; McDonald Creek, 1, July 22; Muncho Lake, 1, July 28; and Lower Liard Crossing, 1, August 23.

Cowan (1939, Occ. Papers B.C. Prov. Mus. No. 1, p. 79) refers Peace River animals to *preblei*; Howell (1936, Proc. Biol. Soc. Wash., 49, pp. 133-136) refers specimens from Atlin and Teslin Lakes, and Dease River and Nelson River to *columbiensis*.

Material in the National Museum is variable. A specimen from Muskwa River and one from Lower Liard Crossing are similar to specimens from Wood Buffalo Park (*preblei*), but McDonald Creek, Muncho Lake, and Steamboat Mountain specimens are similar to Teslin specimens, referred to *columbiensis* by Howell. This suggests that *preblei* may intrude westward into river valleys, but *columbiensis* ranges eastward in the mountains. However, more material should be gathered to substantiate this.

25. Richardson's Flying Squirrel. *Glaucomys sabrinus alpinus* (Richardson)

Said to be common all through the spruce country, but only one specimen taken, at Lower Liard Crossing, Mile 213 on August 5.

Flying squirrels are regarded with disfavour by trappers, as they frequently get into marten sets, which set on a little platform a few feet up a tree trunk are ideally situated to catch them. They come readily to meat baits. Scents, rather than baits, are favoured for fur bearers, in part at least because they are less attractive to squirrels. Another charge against the flying squirrel is that it may clip off fur from a marten hanging in a trap.

The specimen compares well with Jasper specimens.

26. Canada Beaver. *Castor canadensis* subsp.?

Common in all suitable, i.e., lower, parts of the area, and one of the most important fur animals. The big registered trap line has been particularly effective in conserving beaver. Most of the trappers say that beaver have increased under their system of trapping.

No animals were seen, but many ponds, lodges, and beaver meadows were found, and their cuttings were seen along almost every sizeable stream, even along the Liard itself. Many of these cuttings must have been made by wandering animals, far from any lodge or dam.

The following data of occurrence is from trappers, denoted by a (T), as well as the writer's data:

Buckinghorse River area: too high, not good beaver country; only a few occur along the nearby part of Sikanni Chief River where the Buckinghorse joins it, and they are difficult of access (T).

McDonald Creek: not beaver country (T); an old, abandoned dam and lodge in a small tributary at Mile 114 N. The rocky streams subject to sudden violent floods are obviously poor for beaver, despite a certain amount of food.

Lower Liard Crossing: beaver once swarmed in the area between the hot springs and the Highway at Mile 213 N; their dams and ponds are still plainly evident, and a board walk 100 yards long has been built across one old pond, to give easy access to the hot springs. On the old lodge in this pond is a spruce tree at least 20 feet high. A series of older meadows of the same origin connect this pond with the old beaver meadow by the road at Mile 213 N, a meadow that at one time served as a garden for a trapper.

It is doubtful if trapping has driven out the beaver from this particular spot. Rather, it may be that the activities of the beavers themselves have rendered it no longer suitable.

In the country immediately to the north, beaver with marten form the bulk of the fur take (T).

Smith River Valley: Many cuttings of various ages along the river. A trapper who accompanied the author up Smith River said that to find beaver, one should go to the upper reaches of the many little streams that feed this river.

Upper Smith River Valley: beaver is one of the main furs taken (T).

Mile 298 N (near Contact Creek): the little lake by the road has a magnificent beaver dam across the outlet, which has raised the general level of the lake 2 to 3 feet, and the beaver lodge is to be seen far out in the lake.

Lower Post area: one of the main furs taken (T).

The abundance of beavers in certain restricted areas, indicating the heavy populations that can exist, suggests that "beaver ranching" on the large scale, consisting chiefly of simple modifications of water and feed conditions, might prove very successful.

No specimens were taken. Cowan (op. cit., p. 80) refers specimens from Peace River to *canadensis*.

27. Northern White-footed Mouse. *Peromyscus maniculatus borealis* Mearns

Recorded at all stations trapped, except Muncho Pass, from near Muskwa, Mile 252 J, to Irons Creek, Mile 313 N, and even found a few hundred feet above timber line amongst the rocks of the alpine grassland. This is one of the most important forage crops, supplying food for many of the fur bearers, in particular the marten. It undoubtedly occurs more or less commonly over the whole wooded area. Its abundance depends on local conditions and, perhaps, on fluctuations in numbers from year to year. At the camp in Muncho Pass, Mile 165 N, none was taken. The jack pine country, the brushy flats, and even the vicinity of an old trapper's cabin yielded none. This is probably purely a local condition, but the results of trapping in the jack pine country at Irons Creek, Mile 313 N, showed that they were scarce there also, and they may actually be scarce in the pine country. This perhaps correlates with the reported scarcity of marten in pine country.

The heaviest population was in the heavy grass and bush in the edge of the meadow and poplar forest at Lower Liard Crossing. The following results were obtained:

Aug. 11,	20 traps	14 animals	11 <i>Peromyscus</i>
" 12,	20 "	10 "	8 "
" 13,	20 "	7 "	7 "
" 14,	20 "	7 "	6 "

There were 80 trap nights yielding 38 animals, 32 of them *Peromyscus*.

The results of twenty-five traps set in the poplar forest, 300 yards away from the above trapping site, were:

Aug. 11,	25 traps	1 animal	0 <i>Peromyscus</i>
" 12,	25 "	6 animals	6 "
" 13,	25 "	6 "	5 "
" 14,	25 "	3 "	3 "

There were 100 trap nights yielding 16 animals, 14 of them *Peromyscus*.

Fourteen specimens were prepared from the following localities: Steamboat Mountain, 3, September 10, 11; Summit Pass, 1, September 7; McDonald Creek, 1, July 21; Muncho Lake, 3, July 24-28; Lower Liard Crossing, 5, August 6, 22; Irons Creek, 1, August 20.

28. Drummond's Wood Rat. *Neotoma cinerea drummondii* Richardson

Trappers told the author that wood rats were common on Toad River, in the rocky, canyon-like walls, but scarce north of Lower Liard Crossing; one specimen secured at Lower Liard Crossing.

29. Athabasca Red-backed Mouse. *Clethrionomys gapperi athabasca* (Preble)

One specimen was taken at the Muskwa Camp; at Steamboat Mountain camp it was fairly common, and six specimens were taken from September 10 to September 15.

These specimens compare well with topotypical Wood Buffalo Park material.

30. Dawson's Red-backed Mouse. *Clethrionomys dawsoni dawsoni* (Merriam)

In Summit Pass this species was fairly common in the mossy spruce forest up to timber line (three specimens August 29 to September 4); in Muncho Pass one was taken, at the entrance to a little tunnel in mossy pine forest; at Lower Liard Crossing the species was uncommon, and found only in heavy forest (two specimens, August 22, 23); and at Irons Creek one was taken August 20.

It is interesting that at Mile 64 north of Fort Nelson *gapperi* was fairly common, but 40 miles farther north in Summit Pass only *dawsoni* was found. The two forms are evidently strictly representative geographically.

The present series compares fairly well with Atlin specimens of *dawsoni*, and especially in skin characters contrast strikingly with the series of *gapperi* from Steamboat Mountain.

31. Drummond's Meadow Mouse. *Microtus pennsylvanicus drummondi* (Audubon and Bachman)

Found to be not uncommon in the grassy second growth at Steamboat Mountain camp; common in grassy meadows below timber line in Summit Pass, but not found above timber line where only the long-tailed meadow mouse was trapped; the abundance in Summit Pass, the greatest found, is indicated by the following figures:

Sept. 4,	48 traps in meadow,	9 animals,	9 meadow mice
" 5,	48 " " "	8 " "	8 " "
" 6,	48 " " "	6 " "	5 " "

There were 144 trap nights yielding 23 animals, 22 of them meadow mice.

At Muncho Pass and Muncho Lake, meadow mice were fairly common in the scanty grass and shrubbery on alluvial fans; one came commonly into our kitchen tent for crumbs; Lower Liard Crossing, scarce in meadows and edge of forest; scarce at Irons Creek camp, Mile 313 N, in the grassy margin of the little lake shore.

Nineteen specimens were prepared from the following localities: Steamboat Mountain, 2, September 10, 11; Summit Pass, 5, September 3-6; McDonald Creek, 1, July 21; Muncho Pass, 1, August 28; Muncho Lake, 4, July 24; Lower Liard Crossing, 3, August 5, 8; Irons Creek, 3, August 11-14.

There is a great deal of individual variation in colour. This was particularly apparent in the specimens taken at Muncho Lake, where one is pale grey, one is very dark grey, and one is quite reddish. Six males average total length 156 mm., tail 40, hind foot 18.5; five females average total length 150.2, tail 37.8, hind foot 18.

For a review of the Canadian forms of this species See Rand, 1943, Can. Field-Nat., 57, pp. 115-123.

32. Long-tailed Meadow Mice. *Microtus longicaudus* subsp.?

Found only above timber line in Summit Pass, where seven were taken in extensive trapping operations.

R. M. Anderson and the writer have a revision of the Canadian forms of this species in hand that will appear shortly in the Canadian Field-Naturalist.

33. Northwestern Muskrat. *Ondatra zibethica spatulata* (Osgood)

No good muskrat country was seen; the only first hand information as to muskrat occurrence was old sign seen in an old beaver pond at Lower Liard Crossing.

The following information is from trappers:

Lower Liard Crossing: area immediately north, not rat country for the most part, but a few are scattered through it, especially about beaver ponds. However, on one vegetation grown lake, perhaps one mile long by a half mile wide, rats are very common.

Lower Post: not muskrat country, but a few are scattered all through the area.

No specimens were taken, but this is the form recorded from both Peace River area and the Atlin area (Cowan, op. cit., p. 85, and Swarth, op. cit., p. 403).

34. Hudson Bay Meadow Jumping Mouse. *Zapus hudsonicus hudsonicus* (Zimmermann)

Three specimens were collected and another seen, August 6 to August 11 near Lower Liard Crossing, as follows:

One taken under a log in heavy tangle of grass in an old, dry meadow in aspen forest country; one taken in a boggy meadow in spruce country; one taken in a trap floating in a patch of grass in the edge of an old beaver pond in Tropical Valley; and one seen hopping about in the dense alder thickets by an old beaver pond.

Pending a review of the species, these animals are tentatively referred to *hudsonicus*, as did Cowan (op. cit., p. 86) with Peace River specimens.

35. Mountain Jumping Mouse. *Zapus princeps saltator* Allen

Three specimens were taken on successive nights (July 21-23) in the same traps set on the edge of a brush and grass grown stream in second growth country at Mile 114 N, in McDonald Creek Valley.

These specimens agree better with *saltator* than with *princeps* from Jasper Park. Cowan (op. cit., p. 87) records *princeps* from Peace River; Swarth (op. cit., p. 403) records *saltator* from Atlin.

36. American Porcupine. *Erethizon dorsatum* subsp.?

Data are as follows:

Summit Pass: the soldiers at the relay station were reported to have had one alive on September 7; a few droppings were found about rocky ledges just below timber line.

Muncho Pass: heavy deposits of droppings, up to 12 inches thick, were found on the floors of small caves near timber line.

Muncho Lake: a few signs were seen.

Liard Crossing: a few tracks and signs seen and an animal was reported seen on August 4.

In the country to the north, they occur but are scarce according to local information.

Lower Post area: said to be not uncommon.

Very few scars on coniferous trees were seen, and porcupines appear to be scarce to fairly common over the whole area. Certainly they are much scarcer than in many parts of southern British Columbia and parts of eastern Canada. Some natural control may be at work, such as fishers, and perhaps wolves.

Considerable sums have been spent in eastern Canada on porcupine control, and an investigation into the natural control here might be justified.

Cowan (op. cit., p. 87) refers two specimens from Peace River area to *nigrescens*, and Swarth refers Atlin Lake specimens to the same form. However, Anderson and Rand examined a series of Teslin Lake specimens and found they were referable to *myops* (1943, Can. Journ. Research, 21, pp. 292-309). Where this race intergrades with the British Columbia *nigrescens*, of which there were specimens from Telegraph Creek and Jasper southward, remains to be determined.

37. Pika. *Ochotona* sp.?

The mountains above Summit Pass and Muncho Lake were searched in vain for these little animals. The only information as to the occurrence of this animal was from that of Dr. Holland who found pikas in the mountains about Sikanni Chief River, some 25 miles above the Highway.

Cowan (op. cit.) recorded no pikas from Peace River area, nor did Sheldon for the mountains of the Laurier Pass area (1932, Jour. Mammal., 13, pp. 196-203).

Howell (1924, No. Amer. Fauna, No. 47, p. 11) in his review of the genus maps the range of *O. p. princeps* as extending about as far north as Prince George, while the range of *O. collaris* is given (pp. 35, 36) as extending as far south as Bennett, Tagish Lake, and Teslin Lake.

38. Mackenzie Varying Hare. *Lepus americanus macfarlanei* Merriam

The following information was recorded:

Beatton River, about Mile 85 J: last winter rabbits swarmed in this area, and the road was strewn with animals killed by passing motor traffic; it appeared that when a rabbit was run over, others came to nibble its flesh and so were killed, until for miles the trucks were bumping over carcasses. Dr. Raup said that this June they were still swarming in this area.

Buckinghorse River: the author's informant as to the abundance of rabbits on Beatton River says that in the present area the fluctuations in numbers are less apparent, and that if they are scarce on one part of the trap line, they are common on another, so they always have rabbits.

Trutch: five or six were seen in a morning's walk in the forest.

Muskwa: Mile 252 J, fairly common, three or four being seen in a short morning's walk.

Steamboat Mountain: Dr. Williams said rabbits were often seen here in June, but in September only three or four were seen during the author's stay (September 8 to 15).

Summit Pass: none was seen.

McDonald Creek at Mile 114 N: some half dozen were ordinarily seen in a morning spent in the forest. Many of these were young, and the young seemed to fall into two age groups; one about one-third grown, and one about two-thirds.

Mile 114 N to Mile 172 N: during this distance, between 5 and 8 p.m. on July 23, some six rabbits were seen along the road. This was, of course, broad daylight in these latitudes.

Muncho Pass: scarce, only a few old signs and one young animal were seen.

Muncho Lake: not common, only seen occasionally.

Lower Liard Crossing: only fairly common, one or two to six being seen in a morning. The trapper to the north told the author that the rabbit cycle seems to be about 2 years behind that at Fort Nelson. They have not been common during his 6 years' stay in this area, but especially in the last 2 years an increase in numbers has been noted.

Upper Smith valley: reported to be common.

Irons Creek camp, Mile 313: fairly common, several being seen in a morning's walk.

Lower Post: reported to be common now, about six or seven being seen in a morning's walk. They have not yet reached their peak of abundance.

Rabbits are an important food item for two northern animals, the lynx and the fox, and on the rabbit's abundance depends that of these two fur bearers. Many other carnivores eat them when they are common, but turn to other animal food when they are scarce.

A single specimen, taken at Lower Liard Crossing on August 23, compares well with southern Yukon specimens.

39. Rocky Mountain Elk. *Cervus canadensis nelsoni* Bailey

The nearest elk to the area investigated are in Tuchodi Lake area, some 60 miles south of Summit Pass. Locally, the author heard only vague reports that they are abundant there.

Sheldon (op. cit., p. 199) spoke of this band of elk in 1932, as being at the headwaters of the Muskwa, and ranging at least to Liard River, and he writes of having information that they occur to the north of Liard River. A search of the annual reports of the British Columbia game commission yields the following information: In recent years elk were thought to be extinct in Peace River area and northward. In 1932 the game commission reported a good herd in Toad River district. In 1935 they confirmed this report by sending in Game Warden W. L. Forrester, who reported a band of about 200 animals, all in good condition. In 1937 the Muskwa-Toad River herd was estimated at 150 animals. In subsequent years (up until 1941) only general mention is made that they are holding their own in spite of the predation by wolves, and that the closed season on them was continued.

The locality given varies in terminology, but the animals appear to be in Tuchodi Lake area, which is on one of the headwaters of Muskwa River and not far from the headwaters of Toad River. The author found no further evidence that elk exist north of the Liard as suggested by Sheldon.

In the National Museum there are four specimens from Prairie (or Howard) River, one of the headwaters of the Muskwa, collected in 1935 by the Harry Snyder expedition and donated to the Museum by Mr. Snyder. Anderson has compared them, and found that in size they agree better with *nelsoni* than with *manitobensis*.

40. **Rocky Mountain Mule Deer.** *Odocoileus hemionus hemionus* (Rafinesque)

The following data were secured:

About Buckinghorse River: said to occur occasionally in the lower, more broken country.

Steamboat Mountain: Dr. Williams saw tracks on one occasion.

Summit Pass: deer tracks were occasionally seen in August and September. At Lower Liard Crossing, the author saw tracks several times and six or seven deer were said to have wintered in 1942-43 on the grass- and bush-covered hill just north of Mile 212.

Coal River: Dr. Williams saw deer tracks in the river's edge, and mule deer are said to occur on Big Muddy River but not farther north.

This represents an extension of the northwestern known limit of the range of the species (See Cowan, 1936, Calif. Fish and Game, 22, p. 204; and Anderson, 1937, Canada's Western Northland, p. 102).

41. **Moose.** *Alces americana* subsp.?

Again, the importance of this animal necessitates setting forth the details of its occurrence, locality by locality.

Blueberry River country: this is said to be very very good moose country, with many deeply worn trails and licks.

Buckinghorse River: fair moose country here, and the animals are usually in good condition.

Trutch: evidently good moose country; moose tracks and droppings were observed commonly.

Steamboat mountain: though this country had an abundance of moose browse, willow, aspen, and alder, in the extensive old burns, even old tracks and signs were not common.

Summit Pass: no moose signs seen here.

McDonald Creek: at Mile 114 N; very few moose signs.

Muncho Pass: scarce, only a few tracks near timber line.

Muncho Lake: not uncommon, from the lake level to timber line. In winter they are said to go to higher altitudes, where the snow is less deep, in the spring they come down to the lowlands, where snow melts earliest; cows and calves stay at low altitudes, in thickets in the summer; bulls go high up on the slopes, where the bush is low and will not hit against their velvet-covered antlers.

Lower Liard Crossing: fairly common. The big beaver pond below the hot springs is apparently a moose lick, and its bottom is trampled with moose tracks. The meadow by the road at Mile 213 N was said to be a favourite place for moose in the rutting season.

Upper Smith River: said to be fairly common.

Irons Creek camp, Mile 313 N: signs here are old and scarce, but at Mile 320 N, in an area of alder and aspen regrowth, old droppings were everywhere.

Lower Post area: two trappers here say that moose are scarce, and that in the last 2 years they have not shot one. They are inclined to blame this on the abundance of wolves that, they say, has caused the moose to move out of the area.

Compared with conditions on Blueberry River, apparently moose are not very common north of the Minaker, even in the best of the country, like that on the Liard near Lower Crossing.

Trappers used to depend on moose meat for winter dog food, but now are buying and bringing in prepared dog food.

No specimens were collected.

42. Caribou. *Rangifer* sp.?

Buckinghorse River: said to be present summer and winter, though some move westward into the mountains for the summer. The Highway when first put through caused disturbance to the caribou, and they sometimes followed it for many miles without daring to cross it. They are said to become very fat in the autumn, and to be always in good condition here.

Truteh: an old skull seen here, and they were said to be present to the northeast, 15 to 20 miles.

Summit Pass: small numbers of caribou summer on the high country, above timber line, judging from their tracks, and one animal was seen in September. Mr. French saw numbers of tracks, all going up McDonald Creek, above Mile 107 N, on September 8.

Muncho Lake: said to occur summer and winter in small numbers; the author saw two fresh tracks there in July, picked up part of an old skull, and was told of two animals being seen a few days previously.

Lower Liard Crossing: reported to occur occasionally in the spring and autumn.

Upper Smith River: caribou are said to remain summer and winter in the hills nearby, but to be a very poor type of animal, and heavily infected with bots most of the year, except for a short period in the autumn.

Lower Post area: reported to have been extremely common in winter from here to Watson Lake in years past, but in recent years to be only fairly common; one old skull seen; said to summer probably in the Cassiar Range, and that some do so is indicated by Mr. L. Telfer, who told the author that he saw one there in early August.

An attempt to name these caribou without specimens would be foolishness. Cowan (op. cit., p. 90) tentatively recorded *caribou* in Peace River area; Swarth (op. cit., p. 404) reported *caribou* as formerly occurring in Atlin area. However, Murie's extensive work (1935, No. Amer. Fauna, No. 54) indicates that *R. arcticus osborni*, which is lightly differentiated from *R. arcticus stonei*, may occur in winter at least. Sheldon (op. cit., p. 199) records *arcticus osborni* from the Laurier Pass area.

Of the two sets of antlers observed by the author, one was the "rounded" type usually thought of as being typical of *arcticus* (Lower Post); the other set (at Truteh) was more palmate, and of the *caribou* type, but Murie shows that both types occur in the *stonei-osborni* complex.

43. Stone's Mountain Sheep. *Ovis dalli stonei* Allen

Apparently, sheep are common in the mountains above timber line from Summit Pass to about Mile 198.

Specific data follow:

Sikanni Chief River: Dr. Holland saw none in his work in the mountains up to 30 miles above the Highway.

Summit Pass: one old skull picked up.

Toad River: sheep trails evident on the high slopes.

Muncho Pass: said to be common on the surrounding hills; trails seen on the alpine grassland; remains of one sheep found.

Muncho Lake: said to be common in the surrounding mountains and to be seen from the Highway; a band of nine seen on July 28; Dr. Williams saw a lamb on the Highway on July 27 that, timed by motor car, reached a speed of 20 miles an hour; the writer saw a photograph of three sheep, taken about August 1 of this year near the Highway.

Trout River: the author was told of a sheep lick, evidently on Trout River near Mile 190, where an estimated 100 sheep skulls of various ages and size, the result of wolf kills, were scattered about, but, unfortunately, was unable to

visit it. Sheep were also reported as seen commonly above Mile 198, in the last of the mountains along the Highway.

These sheep are dark brown in colour, with whitish heads and rumps, evidently of the same type that occurs in the mountains from just north of Peace River to Mile 100 east of Teslin on the Highway.

44. Rocky Mountain Goat. *Oreamnos americanus* subsp.?

The distribution of goats is apparently considerably more erratic than that of sheep. They are common only in certain spots. These spots are more rugged than those favoured by sheep, and goats are sometimes found in places more isolated from the mountains than are those in which sheep are found.

Specific data follow:

Sikanni Chief River: Dr. Holland reported that about 10 miles up the river is a canyon in which goats are common, and where he saw twenty-seven in one day. There is also a cliff reported on the river, near its junction with the Buckinghorse, where goats occur, and here six were the most reported seen in one day.

Muncho Lake: goats were reported to be common on the red conglomerate cliff along the west side of the lower end of the lake, where nine were seen one evening. This was in mid May. Since then few have been seen, but that they were there all summer is shown by a female with young reported near there in late July.

